

Lesson 12: Designing a Model Membrane (associated with EiE[®] Lesson 4, Part 1)

Lesson Topic: Designing a model membrane using knowledge of the properties of membranes, the properties of model membrane materials, and the Engineering Design Process

DESIRED RESULTS (教学目标)

Academic Content Objectives: Students can...

Chinese Language Arts

- Retell key elements of a story
- Apply writing composition skills

Science and Engineering

- Apply scientific understandings gained through prior analyses of natural membrane properties (raisin skin experiment) and properties of model membrane materials (testing materials experiment) to design of a model membrane
- Implement the steps of the Engineering Design Process
 - “Imagine” model membrane designs and select one design to “create” and “test”
 - Select materials for a model membrane design
 - Draw and label a model membrane design plan with detailed diagrams and materials lists
 - “Create” and test model membrane designs using established criteria
- Offer a rationale for model membrane design, specifically referencing the quantities and properties of testing materials

Math

- Apply knowledge of decimals/fractions and measuring units to report water volume
- Identify that *cup* and *milliliter* are different measuring units of liquid volume

Learning Strategies: Students can...

- Work cooperatively with a group
- Use pictures to retell a story
- Make adjustments to improve a design
- Use background knowledge
- Make predictions
- Plan and organize
- Take notes

Chinese Language Objectives: Students can...

Functions and Forms

Content-obligatory (CO)

- Ask and answer questions using question words
- Describe attributes of person/place/thing using modifying phrases
- Describe emotional states of main characters using adjectives or adverbs
- Express location using 在 [zài] in a locative phrase
- Recount events in past time using action verbs with 了 (temporal marker) and dependent time phrase/clause in complex sentence
- Describe actions of main characters using verb + resultative complements (directional)
- State use/function of something using nominalization and purpose verb phrase, 来 + verb + object
- Order a series of events using sequencing adverbs
- Support ideas/opinions using compound sentences with adverb 因此
- Report about things, actions, or events in past time using action verbs with 了 (temporal marker) and adverbs of time
- Predict cause-effect relationship using hypothetical conditional sentences with 如果/要是....., (那么)..... and the adjectival verb 可能
- State quantities of materials using numbers and appropriate classifiers
- Suggest an alternative idea using serial verb construction with pivotal noun phrase
- Predict degree of probability of something using auxiliary “helping” verbs
- Give emphasis to the specific direct object by using 把 or 让/使 construction and placing the direct object before the verb
- Distinguish the superlative degree among two or more things/ideas within a topic using a locative phrase 在...里/在...中 to identify the whole topic, and the superlative adverb 最
- Make comparison between two things using A + 比 (comparison marker) + B + (更) + adjective structure
- Give reasons for actions/choices/preferences using preposition 为了
- Construct characters to form words and phrases adhering to character structure rules and stroke order guidelines
- Use a developing understanding of basic units of word formation in Chinese to infer and construct meaning with written text

Content-compatible (CC)

- Make inferences based on visual clues
- State or identify what/who something is or is not
- Express a personal opinion

- Express agreement/disagreement
- Report events in past time using adverbs of time
- Ask for clarification about feedback/advice/idea
- Make a request using different degrees of politeness
- Give a command using serial verb construction
- Negotiate to reach consensus

Vocabulary

	了解 Recognize	识记 Produce
Content-obligatory	<p>Measurement Words 液体量杯 measuring cup, 半个 one half, 四分之一 one fourth/quarter, 分数 fraction, 小数 decimal, 测量 to measure, 成功 success, 杯 cup, 毫升 milliliter, 体积 volume</p> <p>Properties of Test Materials and Membranes 材料的特性 properties of materials, 薄膜模型的特性 properties of model membrane, 材料名称 material name, 闪亮 shiny, 能控制流速 to be able to control rate of flow</p>	<p>Story Elements 人物 character, 场景 setting, 时间 time of day, 事件 events, 问题 problem, 解决方案 solution</p> <p>Engineering Design Process 工程设计步骤 Engineering Design Process, 提问 ask, 思考 imagine, 设计 plan, 制作 create, 改进 improve, 步骤 step, 设计 to design, 模型 to model/modeling, 工程师 engineer, 实验 experiment, 科学家 scientist, 薄膜 membrane, 去解决实际问题 to solve real-world problems, 试一试新的想法 to try out new ideas, 运用想象力 to use imagination</p> <p>Test Materials 咖啡过滤纸 coffee filter, 纱布 cheesecloth, 毡布 felt, 海绵 sponge, 尼龙纱窗布 nylon screen, 铝箔纸 aluminum foil, 有一个孔的铝箔纸 aluminum foil with one hole, 有两个孔的铝箔纸 aluminum foil with two holes</p> <p>Experiment Words 实验 experiment, 推测 to predict, 辅助概念 supporting ideas, 科学日志 science journal, 滴 to drip</p> <p>Properties of Test Materials and Membranes 平滑 smooth, 厚 thick, 薄的 thin, 白色的/米色的 white/beige, 纸做的 made of paper, 有孔 has holes, 没有孔 does not have holes, 天然的薄膜 natural membrane, 人造的薄膜 human-made membrane, , 穿过/通过 to pass through, 流过 to flow through 阻挡 to block, 保护 to protect</p>

	了解 Recognize	识记 Produce
Content-compatible	<p>Instructional Activities 展示 Show and Tell, 轮流 to rotate, 水杯 water pitcher, 文件夹 folder, 全班 whole class, 小组 small group, 伙伴 partner</p> <p>Model Membrane Design Words 容器 container, 盖子 lid, 穿(洞/孔) to pierce holes, 分层 to layer, 把它摺起来 to fold something, 修剪成适合的大小 to cut and make something fit, 折 to bend, 剪 to cut</p>	<p>Job Cards/Roles 中文督察员 Chinese Champion, 材料管理员 Magnificent Materials Manager, 记录员 Remarkable Recorder, 工作管理员 Terrific Taskmaster, 演示质检员 Polished Presenter</p>

Note: In the **Language-Function-Form-Vocabulary Connection** section you will find additional vocabulary that is directly supportive of the various language functions. The particular words and phrases you choose to target will depend on your students' proficiency levels. Because of this, we have not included all vocabulary here. At the end of this lesson, you will find a table that provides more detailed information about the lesson vocabulary identified above.

PREPARATION (教学准备)

Materials Needed for Instruction

- Engineering is Elementary® (EiE®) binder, Lesson 4, Part 1: Materials, page 100, (prepare these before starting class)
- Interactive whiteboard pages for Lessons 12: MMIC 12-IWB
- 6 sheets of large flipchart paper and 6 different colored markers for Activity 1
- Digital photos of students doing the materials testing from Lesson 11
- Students' science notebooks
- Laminated job cards for group work
- Digital camera for taking photos of the model membrane design process
- Handouts:
 - a. MMIC 11-4 (EiE® {3-3}): *Testing Model Membrane Materials* (Completed during Lesson 11; students should have it in their science notebooks)
 - b. MMIC 12-1a, 12-1b, 12-1c: *Story Retell Pictures*, one per group
 - c. MMIC 10-3 (EiE® {4-1}): *The Engineering Design Process*
 - d. MMIC 12-2 (EiE® {4-4}): *Designing a Model Membrane: Ask!*, one per group
 - e. MMIC 12-3 (EiE® {4-5}): *Designing a Model Membrane: Imagine!*, one per student
 - f. MMIC 12-4 (EiE® {4-6}): *Designing a Model Membrane: Plan!*, one per group

Classroom Management Tip: *Instead of giving one bin to each group, use three plastic bins at the front or back of class and have the groups bring their models there.*

LEARNING ACTIVITIES (教学活动)

Preview Phase—“Intro” Activities

Students will use pictures from the story to recall Juan Daniel’s motivation for designing a model membrane and then reconstruct the process that he used to design his model membrane. Students will identify the model membrane materials that they tested in Lesson 11 and, considering their properties, predict why they might/might not work well. The teacher will then give students an overview of their design challenge.

Time: Learning Activity 1—40 minutes
Learning Activity 2—30 minutes

Learning Activity 1

1. Hang six large sheets of flipchart paper around the classroom. Allow for sufficient space between each large sheet of posted paper so that a small group of students will be able to cluster around each sheet. Label each sheet of paper with a chapter number (1-6, one chapter per paper). Attach story pictures from *Juan Daniel* Chapters 1-6 (MMIC 12-1a, 12-1b, 12-1c: *Story Retell Pictures*) to the corresponding chapter’s flipchart paper. Each sheet will be referred to as a “chapter station.”
2. Put students into six working groups. Number the groups 1-6 and give each group a different colored marker.
3. Choose a 记录员 (**Remarkable Recorder**) to start for each group.

Note: *Student groups will need to change the 记录员 (Remarkable Recorder) when they move to each new flipchart paper/station.*

4. Tell the students that they will start this next activity at the chapter station that shares the same number as their group (i.e., Group 1 at Chapter 1’s flipchart paper, etc.). While there, the 记录员 (**Remarkable Recorder**) will write down any words, phrases or sentences that students in the group can think of to describe the chapter picture: Who they see, where it takes place, what is happening in the picture, and why. **Students will have only two minutes at each chapter station and need to work together to share and record as many ideas as they can before they hear the signal to change stations.** After two minutes, give a signal and direct all groups to rotate clockwise around the room, stop at the next station, read what is there and add any new words, phrases or sentences to the sheet that they can. Groups will continue until the rotation is complete and they are back at their first station.
5. Once groups are at their original station, ask them to read through all of the ideas for their chapter that are written on the flipchart paper, and ask them to prepare an informal oral retelling of the key elements/events in the chapter. Each group member needs to participate in the group’s retelling. Briefly review language for describing characters/events and story sequencing.

6. After 3-4 minutes, give a signal to have groups return to their seats. Before beginning with the group retelling activity, introduce the following questions on page 1 of MMIC 12-IWB and ask students to think about these questions as they listen to the whole class chapter-by-chapter story retelling:

中文	English
为什么 Juan Daniel 担心那只他找到的青蛙? (远离热带雨林, 青蛙会因为没有足够的水而无法生存。)	Why was Juan Daniel worried about the frog that he found? (It did not have enough water to survive far from its rain forest home.)
为什么水对青蛙来说这么重要? (因为水是青蛙生存的基本需求。)	Why is water so important to the frog? (It is a basic need for survival.)
青蛙怎样喝水? (青蛙通过它的皮肤来喝水。青蛙的皮肤是一种薄膜。)	How does a frog drink water? (It can drink water through its skin, which is a membrane.)
Juan Daniel 要如何给青蛙补充水分? (他设计了一个薄膜模型, 让水慢慢地滴在青蛙的皮肤上。)	What did Juan Daniel do to help bring water to the frog? (He designed a model membrane that would slowly drip water onto the frog's skin.)
他设计薄膜模型的时候有哪些步骤? (工程设计步骤的五个步骤: 提问题、思考、在家中找材料并设计、制作、测试并改进。)	What steps did he follow as he designed his model membrane? (The five steps of the Engineering Design Process: Ask questions, imagine solutions, test materials from around the house and draw a plan, create his model, test it and change it to improve it)

7. Invite student groups up one at a time for the informal oral story retelling. As groups retell the story chapter by chapter, draw attention to the elements of narrative: characters, setting, events that lead to a problem, and resolution of the problem.
8. Finally, tell the class that today, they too will have the chance to design a model membrane for Juan Daniel's frog using the same process that Juan Daniel used.

Language Function-Form-Vocabulary Connections (Activity 1)		
CO LP 12.1.1	Ask and answer questions using question words	
For example:		
Approaching	Attaining	Expanding
..... 吗? Use of ma 是不是.....? Is or is not?	谁.....? (Who) 什么.....? (What) 哪里.....? (Where) 什么时候.....? (When) 怎么.....? (How) 为什么.....? (Why)	几/多少? (How many) 哪(些).....? (Which)
Form focus: Placement of question words		
Most question words in English occur at the beginning of a sentence. However, question words in Chinese occur in a variety of positions. Generally, question words appear in the same position as the grammatical function they serve in the sentence. For example: 谁参加足球比赛? (Who is going to play the soccer game? ["Who" occurs in subject position]) 你看见几个足球运动员? (How many soccer players did you see? ["How many" is in the # position of the noun phrase # + classifier + noun])		
Noticing and awareness spotlight: Use of 吗? 吧? 呢?		
A few particles are commonly used at the end of questions. 吧? is used to invite agreement. 呢? is a tag question meaning “, and you?” 吗? is a question particle that is used when one expects a “yes” or “no” response.		

CO LP 12.1.2	Describe attributes of person/place/thing using modifying phrases	
For example:		
有很多植物的热带雨林 (the rain forest that has lots of plants) 绿色的、提供栖息地的热带雨林 (the rain forest that is green and provides shelter)		
Approaching	Attaining	Expanding
热的 (hot) 多雨的 (rainy) 绿色的 (green) 湿的 (wet) 好 (good/nice) 坏 (bad/mean)	有很多植物的 (that has lots of plants) 有很少植物的 (that has few plants) (没)有帮助的 (that is helpful/not helpful)	提供栖息地的 (that provides shelter) 踢足球踢得好的 (that is good at soccer) 跑得快的 (that runs fast)

热心 (warmhearted) 高 (tall) 矮 (short)		
Attributive adjective [adj. + 的] + Head noun	Relative clause [(没)有 + noun + 的] + Head noun	Relative clause [verb + noun + 的] + Head noun
Form focus: Relative clause [verb + noun + 的] + head noun		
<p>Modifying phrases can be either attributive adjectives, e.g., 多雨的(rainy) or relative clauses, e.g., 有 (have) 很多植物 (lots of plants) + 的 (that has lots of plants). Modifying phrases are placed in front of the head noun (e.g., 提供栖息地的热带雨林).</p>		
Noticing and awareness spotlight		
1. The negation of 有 (have) is 没有		
<p>The negative particle 没 (méi), not 不 (bù), must be used to negate 有 (yǒu) [have]. 没 can be used by itself to express 没有 (méi yǒu). If 没 is used by itself, 有 is assumed such that 没 = 没有.</p>		
2. Adjective repetition		
<p>Adjective repetition occurs frequently in Chinese. There are different ways to do this:</p> <ol style="list-style-type: none"> 1. “aa” form, e.g., 长长 (very long), 厚厚 (thick)、薄薄 (thin)*; 2. “abb” form, e.g., 白皑皑 (snow-white, pure white, as very white as snow), 毛茸茸 or 毛茸茸 (hairy or downy), 亮晶晶 (glistening, sparkling, shining), 湿漉漉 (wet, moist); 3. “aabb” form, e.g., 清清楚楚 (clear), 恍恍惚惚 (in a trance, absent-minded), 红红火火 (as very red/warm as fire). <p>* Use of double adjectives is typical for young children.</p>		
3. The “monosyllabic” rule and use of 的		
<p>When describing persons, places and things, the use of 的 between adj. and noun will occur if the adjective is made up of more than one syllable, for example, 两只有蹼的脚 (two webbed feet).</p> <p>However, use of 的 between the adjective and noun is omitted if the adjective is only one syllable. For example, 两只大眼睛 (two big eyes).</p>		

CO LP 12.1.3	Describe emotional states of main characters using adjectives or adverbs	
For example:		
Approaching	Attaining	Expanding
高兴 (happy) 伤心 (sad) 累 (tired) 害怕 (afraid/scared) 生气 (angry) 紧张 (nervous) 不好意思 (embarrassed) 平静 (calm) 兴奋 (excited) 骄傲 (proud) 惊讶 (amazed) 满足 (satisfied)	高兴的脸 (happy face) 高兴地说 (speak happily) 伤心的男孩 (sad boy) 伤心地哭 (cry sadly) 愉快的歌 (joyful song) 愉快地唱 (sing joyfully) 不好意思的表情 (embarrassed expression) 不好意思地笑 (smile embarrassedly)	迷惑 (confused) 失意 (frustrated) 焦虑 (anxious) 感激 (grateful) 痛苦 (agonized) 愉快 (amused) 惊愕 (astonished) 精疲力尽 (exhausted) 雄赳赳, 气昂昂 (cocky)
Juan Daniel 很伤心。 Juan Daniel is very sad.	Juan Daniel 有(一)点儿紧张, 可是他很快地平静下来。 Juan Daniel was a little bit nervous, but he quickly calmed down.	Juan Daniel 踢足球踢得精疲力尽。 Juan Daniel played soccer so hard that he was exhausted.
Subj. + “very” + adj., (“be” verb is omitted in Chinese.)	..., Subj. + adv. + “地” (de) + Verb	Subj. + Verb + Object + Verb (same as before) + “得” + complement
Form focus: Use of 的、地、得		
<p>的 (de) is used when an adjective and/or a pronoun modifies a noun. The form is: Adj./pron. + 的 + Noun, for example, 炎热的夏天 (sweltering summer), 我们的薄膜模型 (our model membrane design)</p> <p>地 (dì) is used when an adverb modifies a verb. The form is: Adv. + 地 + Verb (unlike in English!), for example, 高兴地欢呼 (cheer happily)</p> <p>得 (de) is used when a verb complement is used after the main verb. The form is: Verb + 得 + Adv., for example, 我跑得快。 (I ran fast.) Sometimes, the main verb can be repeated if there is an object following the main verb. The form is: Verb + Object + Verb + 得 + adv., for example, 我踢足球踢得好。 (I kick the soccer ball well.)</p>		

Noticing and awareness spotlight					
1. 落 as polyphone					
To be a polyphone, “duō yīn zì” (多音字) in Chinese, a character must have two or more pronunciations and multiple meanings. Each pronunciation goes with one meaning. For example:					
落	<table border="1" style="border-collapse: collapse;"> <tr> <td style="padding: 2px 10px;">luò</td> <td style="padding: 2px 10px;">落后 verb, meaning “fall behind, fall down”</td> </tr> <tr> <td style="padding: 2px 10px;">là</td> <td style="padding: 2px 10px;">落下 verb, meaning “forget, leave behind”</td> </tr> </table>	luò	落后 verb, meaning “fall behind, fall down”	là	落下 verb, meaning “forget, leave behind”
luò	落后 verb, meaning “fall behind, fall down”				
là	落下 verb, meaning “forget, leave behind”				
2. Use of “有 + (一)点儿” structure					
“Be” verb is sometimes translated into “have/has” when “(一)点儿” is used in front of an adj., e.g., 我有一点儿累。(I am a little tired.) The structure is: Subj. + 有 (have/has) + “(一)点儿” + adj.					

CO LP 12.1.4	Express location using 在 [zài] in a locative phrase		
For example:			
Approaching	Attaining	Expanding	
在这儿 (here [vernacular]) 在这里 (here, this place) 在那儿 (there [vernacular]) 在那里 (there, that place) 在家 (home) 在饭馆儿 (restaurant) 在足球场 (soccer field) 在这个部分 (this section)	在...前边/面/头 (in front of) 在...后边/面/头 (behind) 在...上边/面/头 (above) 在...下边/面/头 (below) 在...里边/面/头 (inside) 在...外边/面/头 (outside)	在这两个部分的中间 (in the center of these two sections/parts/areas) 在又热又干燥的足球场上 (on the hot, dry soccer field)	
在 (zài) + adverb of location (here, there)/noun (home, restaurant, soccer field, country)	在 (zài) + noun + locative particle	在 (zài) + modifying phrase + 的 + noun OR 在 (zài) + modifying phrase + 的 + noun + locative particle	
Form focus			
1. Formation of locative phrase: “在 (zài) + noun + locative particle”			
To express location Chinese speakers use a locative phrase that begins with the coverb 在 (zài). For example, “在 zai + concrete noun + locative particle”			

在守门员后面： behind the goalie
在足球场上： on the soccer field

To provide more detail within a locative phrase, we can add a modifying phrase, for example, “在 (zài) + modifying phrase + (的) + noun (+ locative particle).”

There are a few different ways to construct a modifying phrase:

1. Adj + 的: For example, 在又热又干燥的足球场上 (on the hot, dry soccer field)
2. Noun phrase + 的: 在这两个部分的中间 (in the center of these two sections)
3. Relative clause: See CO 4.1.3

2. Placement of locative phrase

Unlike in English, a locative phrase is placed either at the beginning of the sentence or before the main verb, NOT at the end of the sentence.

A locative phrase, e.g., “在 zai + concrete noun + locative particle,” can be placed in a sentence as follows:

1. Directly before the main verb. (Typical placement)
我们在咖啡过滤纸上放了一块海绵。We put a sponge on the coffee filter.
(Subj + locative phrase + verb + past tense marker + object.)
2. At the beginning of the sentence and set off by a comma. (for emphasis)
在咖啡过滤纸上, 我们放了一块海绵。On the coffee filter, we put a sponge.
(Locative phrase, subj + verb + past tense marker + object.)
3. After main verb in a 把-construction (giving emphasis to the direct object)
我们把一块海绵放在咖啡过滤纸上了。We placed a sponge on the coffee filter.
(Subj + 把-construction [把 + object + verb + complement] + past tense marker.)

Noticing and awareness spotlight: Use of suffixes 边、面、头

Locative particles such as 前 (in front of) and 后 (behind) will typically be used with one of the following suffixes: 边 (-bian)、面 (-mian)、头 (-tou) and become, for example, 前边/面/头.

The following adverbs of location can be used interchangeably:

这儿 (here [vernacular]); 这里 (here, this place)
那儿 (there [vernacular]); 那里 (there, that place)

CO LP 12.1.5		Recount events in simple past time using action verbs with 了 (temporal marker) and dependent time phrase/clause in complex sentence	
Approaching		Attaining	
Expanding			
Juan Daniel 跟朋友一起去踢球了。 Juan Daniel went to play soccer with his friends. 他设计了一个薄膜模型。 He designed a model membrane.	足球比赛的时候, José Eduardo 把 Juan Daniel 推倒了, Juan Daniel 的胳膊受伤了。 While at the soccer game José Eduardo pushed Juan Daniel down and Juan Daniel' arm 他给青蛙设计了一个薄膜模型。 He designed a model membrane for the frog.	正当 Juan Daniel 鼓足劲儿要出脚的时候, 突然有人用力地推了一下他的肩膀。 When Juan Daniel was about to kick the soccer ball, someone shoved his shoulder hard. 他设计了一个薄膜模型, 让水慢慢地滴在青蛙的皮肤上。 He designed a model membrane that would slowly drip water onto the frog's skin.	
Simple past time using action verb with temporal marker 了	Use of dependent time phrase in complex sentence and temporal marker 了	Use of dependent time clause in complex sentence and temporal marker 了	
Form focus			
1. Use of 了 as temporal marker			
Simple past time can be communicated using 了 (temporal marker), e.g., action verb + 了 (temporal marker). The temporal marker “了” is positioned either immediately after the main verb or at the end of the sentence/clause.			
2. Use of dependent time phrase/clause in complex sentence			
Mandarin uses adverbs of time and adverb of time phrases to connect two clauses and form one complex sentence. The first clause may consist of			
<ul style="list-style-type: none"> • An adverb of time placed at the end of the first clause [noun + adverb of time 的时候], e.g., 足球比赛的时候, (While at the soccer game, ...) • or an adverb of time phrase that is separated into two parts [当(part 1) + simple SVO sentence + 的时候 (part 2)], e.g., 当我们测试尼龙纱窗布的时候, (When we tested the nylon screen,...). 			
For example, Noun/simple SVO sentence + adverb of time phrase 以后.....后 (after), + main clause. Noun/simple SVO sentence + adverb of time 以前 (before), + main clause.			

Noun/simple SVO sentence + adverb of time phrase 当.....的时候 (when/while at), + main clause.		
3. Use of 把- and 让/使-construction		
Similar to “把-sentence,” the “让/使-construction” allows one to place the direct object in front of the main verb, which is not typical word order in Chinese. This draws more attention to what is happening to the object itself.		
Noticing and awareness spotlight		
1. Coverbs/prepositions		
Approaching	Attaining	Expanding
把 (direct object marker) 比 (compare) 从 (from)..... 到 (to a place) 给 (for, to) 跟 (with) 和 (with, and)	除了 (except, besides) 对[于] (concerning, with regard to) 关于 (concerning, with regard to) 为[了] (for, in order to) 由于 (because of, due to)	至于 (concerning, with regard to) [根]据 (according to) [依]照 (according to) 靠 (depend on) 离 (separated from) 像 (like)
Prepositions are often referred to as coverbs. They are called coverbs because they are partly like verbs and partly like prepositions. Most coverbs used to be verbs at earlier stages of the language and many still have characteristics of verbs and can be used as verbs that have similar meanings, for example, 给 (gěi) as a verb means “to give” and as a preposition/coverb it means “to” or “for.” For example, 他给青蛙设计了一个薄膜模型。He designed a model membrane for the frog. Juan Daniel 跟朋友一起去踢球了。Juan Daniel went to play soccer together with friends. Prepositional phrases such as 给青蛙 (for the frog) and 跟朋友一起 (together with friends) are typically place directly in front of the main verb. When the verb consists of an auxiliary “helping verb” + main verb, the prepositional phrase is placed after the auxiliary and before the main verb, for example, 我想跟她/他做葡萄干实验。(I want to do the raisin experiment with her/him.)		
2. Use of preposition 跟		
The preposition/coverb 跟 has several different uses. A useful sentence structure that uses this preposition is as follows: Subj./topic + preposition phrase (preposition 跟+ object) + verb + (noun phrase). 我想跟她/他做葡萄干实验。 I want to do the raisin experiment with her/him. Juan Daniel 和他的朋友们跟镇上的其他男孩子们比赛踢球。 Juan Daniel and his friends play soccer with the other boys in town		

CO LP 12.1.6	Describe actions of main characters using verb + resultative complements (directional)		
Approaching	Attaining	Expanding	
<p>Type 1</p> <p>For example: 跑来 (to run over here-toward the speaker) 跑去 (to run over there-away from the speaker) 跳来跳去 (to jump around) 看去 (look across) 走去 (walk across)</p>	<p>Type 2</p> <p>For example: 带上 (bring along) 伸出 (stretch something out), 想出 (think of an idea, have an idea jump out) 跑回 (run back to some place)</p>	<p>Type 3</p> <p>For example: 跑过来 (to run across) 跑过去 (to run across) 冲过来 (to dash over) 踢进去 (to kick in)</p>	
Form focus: Verb + Resultative complements (directional)			
<p>In Chinese, each action verb communicates one specific action. For example, 看 (look) simply refers to the act of looking. To communicate that the looking resulted in seeing something, one needs to use a “verb + resultative complement” structure that will consist of an additional verb or adjective. For example, 看 (look) + 见 (perceive) = to see something. Other examples are 听 (listen) + 懂 (perceive) = to understand by listening, 打 (hit) + 倒 (down) = to push down.</p> <p>“Verb + resultative complement” structures are always composed of two elements. The second element indicates action resulting from the action or process communicated by the first element. For example: 他把门拉 (1. to pull) 开 (2. to open) 了。 [He pulled the door open.]</p> <p>There are several kinds of results that can be expressed by a “verb + resultative complement” structure. These include cause (我把茶杯打破了。 [I broke the teacup.]), achievement (我把那个字写清楚了。 [I wrote that character clearly.]), and direction (她跳过去了。 [She jumped across.]).</p> <p>Directional “Verb + resultative complement” structure: The first verb in this structure indicates movement from one place to another, the second verb (which may consist of one to two verbs) communicates the direction in which the subject moves. There are three main types of directional verbs:</p> <p>Type 1. Direction relative to the speaker 去 (go) indicates movement away from the speaker. 来 (come) indicates movement toward the speaker.</p>			

Type 2. Direction of the motion in space.
 上 (shàng) [ascent – up] to climb
 下 (xià) [descent – down] to decline or go downwards
 进 (jìn) [enter – in] to enter
 出 (chū) [exit – out] to go out (of a place)
 起 (qǐ) [rise – up] to rise
 回 (huí) [return – back] to return
 过 (guò) [cross – over] to cross
 开 (kāi) [open – apart, away] to start

Type 3. “Type 2 + Type 1” combination, direction of the motion relative to the speaker.
 上来 (ascend-come= up toward the speaker)
 上去 (ascend-go = up away from the speaker)
 出来 (exit-come = come out)
 出去 (exit-go = go out)

CO LP 12.1.7	State use/function of something using nominalization and purpose verb phrase, 来 + verb + object		
Approaching	Attaining	Expanding	
青蛙用皮肤喝水。	青蛙是用它的皮肤来喝水的。	青蛙需要用它的皮肤来喝水。 The frog needs to use its skin to drink water.	
The frog uses skin to drink water.	The frog uses its skin to drink water.	Subj. + Verb ₁ 需要 + Verb ₂ 用 + pronoun + 的 + Object ₁ + purpose verb phrase [来 + Verb ₃ + Object ₃]	
Subj. + Verb ₁ + Object ₁ + Verb ₂ + Object ₂ [Verb ₁ and Verb ₂ are parallel verbs. They are both actions performed by the same Subj.]	Subj. + Verb 是 + nominalization [Verb ₁ 用 + pronoun + 的 + Object ₁ + 来 + Verb ₂ + Object ₂ + 的].	青蛙通过它的薄膜来喝水。 The frog drinks water through its membrane. Subj. + prepositional phrase (coverb + Object ₁) + purpose verb phrase [来 + Verb ₃ + Object ₃]	

Form focus
1. Multiple uses of 来
<p>1. “来” as an action verb, meaning “to come”.</p> <p>e.g., 他昨天来过两次。(He came twice yesterday.)</p> <p>2. “来” is used to replace the verb in previous sentence.</p> <p>e.g., 把这杯茶喝完, 我们再来一瓶! (Drink up this cup of tea, we will drink another!)</p> <p>3. “来” is placed in front of a verb phrase, indicating purpose.</p> <p>e.g., Juan Daniel 需要水杯来喝水。(Juan Daniel needs a water bottle to drink water.)</p> <p>4. “来” is used to indicate the direction of an action verb.</p> <p>e.g., 你把那本书拿来! (Bring that book over here!)</p>
2. Nominalization using 的
<p>A verb/verb phrase can become a noun by placing the particle 的 (de) after it. For example, the verb phrase 你说 (you say) can function as a noun phrase 你说的, meaning “what you say” in 你说的是 (What you say is...).</p> <ul style="list-style-type: none"> If the subject is expressed in the verb phrase 你说 (you say), it is likely that the noun phrase, 你说的 (what you say), will function as the direct object in the sentence, in this case, the “what” you say. If the direct object is expressed in the verb phrase, e.g., 种水果 (grow fruit), it is likely that the noun phrase, 种水果的, will function as the subject of the sentence, as that is the information that is lacking.

CO LP 12.1.8	Order a series of events using sequencing adverbs		
Approaching	Attaining	Expanding	
<p>第一、第二、第三.....</p> <p>Ordinals: first, second, third...</p> <p>首先,, 然后,, 最后,</p> <p>First, ..., later, ..., finally, ...</p> <p>开始</p> <p>in the beginning</p> <p>.....先.....,后.....</p> <p>...before..., ...after...</p>	<p>首先,, 再,, 接下来,</p> <p>Initially, ..., then, ..., next, ...</p> <p>起先、起初</p> <p>in the beginning</p> <p>后来</p> <p>later on</p> <p>那以后</p> <p>after that</p> <p>结束</p> <p>at the end</p>	<p>于是</p> <p>consequently, as a result</p> <p>总之</p> <p>in conclusion</p> <p>稍后</p> <p>afterwards</p> <p>最终</p> <p>at the end</p>	

For example:		
<p>第一步是……。在第一步里，他……。 第二步是……。在第二步里，他……。 第三步是……。在第三步的时候，他……。</p> <p>The first step was _____. In the first step, Juan Daniel _____. The second step was _____. In the second step, he _____. The third step is _____. In the third step, he _____.</p>	<p>在第一场足球比赛，Juan Daniel 一开始的时候踢进了第一球，后来 José Eduardo 把 Juan Daniel 推倒了，Juan Daniel 的胳膊受伤了。最后，Juan Daniel 要在板凳上休息。</p> <p>In the first soccer game, Juan Daniel scored a goal at the beginning of the game, later on José Eduardo pushed him down and his arm was hurt. Finally, Juan Daniel had to sit on the bench.</p>	<p>在上星期第一场足球比赛，Juan Daniel 和队友们起初先进了一球，稍后，正当 Juan Daniel 鼓足劲儿要出脚的时候，突然有人用力地推了一下他的肩膀。于是，Juan Daniel 的胳膊受伤了，他不可以比赛。</p> <p>In the first soccer game last week, Juan Daniel’s team was winning at the beginning, then, when Juan Daniel was about to kick the soccer ball again, suddenly someone shoved his shoulder hard. As a result, his arm was hurt and he could not play.</p>
Form focus: Placement of sequencing adverbs		
Sequencing adverbs are usually placed at the beginning of the sentence and set off with a comma.		
Noticing and awareness spotlight		
1. Use of punctuation mark “、” vs. “，”		
<p>In written Chinese, “、” is typically used when you want to list a series of actions or items. For example,</p> <p>工程设计步骤的五个步骤：提问题、思考、在家中找材料并设计、制作、测试并改进。 The five steps of the Engineering Design Process are: Ask questions, imagine solutions, make a plan, create a model, and improve it.</p> <p>Written Chinese also has the “，” (comma). The comma is used to set off a dependent clause or an adverbial phrase.</p> <p>上星期冠军赛的时候，Juan Daniel 和队友们起初落后，稍后他们用工程设计程序制定了一个取胜的好办法，于是他们取得了胜利。 In the championship game last week, Juan Daniel’s team was losing at the beginning, afterwards they came up with a plan using the engineering design process, and finally, they won the game.</p>		

CO LP 12.1.9 Support ideas/opinions using compound sentences with adverb 因此		
Approaching	Attaining	Expanding
Juan Daniel 担心那只青蛙 因为青蛙需要水。	青蛙需要足够的水来生存，因此，Juan Daniel 担心那只青蛙。	由于远离热带雨林，青蛙会因为没有足够的水而无法生存。因此，Juan Daniel 担心那只青蛙。
Juan Daniel worries about the frog because it needs water.	The frog needs water to survive, therefore, Juan Daniel worries about the frog.	Due to it being far from its rain forest home and the frog's need for water, as a result, Juan Daniel worries about the frog.
....., 因为 (because)..... 因为 (because)....., 所以 (so)....., 因此 (as a result, therefore),	由于 (due to)....., 因此 (as a result, therefore),
Form focus:, 因此 (as a result, therefore),		
因此 (as a result, therefore) is an adverb that can be used instead of the conjunction 因为 in the second clause.		
Noticing and awareness spotlight: Use of 由于 (due to)		
由于 (due to)....., reflects a more formal register and is more likely to be used in written communication.		

CC LP 12.1.10 Make inferences based on visual clues		
For example:		
Approaching	Attaining	Expanding
我猜/想 I guess /think 也许/可能..... Maybe/ Perhaps... 在我看来..... It seems to me that .../In my opinion, ...	我敢肯定..... I bet that... 图中的.....告诉我们..... The ... in the picture tells us that...	我估计/推断/猜测..... I expect/deduce/suppose that 似乎..... It seems as if... 从第七章中可以看到...../如第七章所示..... As is seen from chapter 7...

CC LP 12.1.11	Express a personal opinion and request agreement		
For example:			
Approaching	Attaining	Expanding	
我觉得／想, 你呢? I feel like/think....., and you? 也许／可能, 你呢? Maybe/perhaps....., and you?	在我看来....., 你也同意吗? It seems to me like..., do you agree? 对我来说,, 你也同意吗? In my opinion,, do you agree? 我认为....., 你也同意吗? I believe/think ..., do you agree?	我建议....., 你也是这么想的吗? /吧? I suggest..., do you think so? 我的看法是....., 你也是这么想的吗? /吧? My thoughts are....., do you think so? 我是说....., 你也是这么想的吗? /吧? What I mean is....., do you think so?	
Noticing and awareness spotlight: Use of 吗? 吧? 呢?			
A few particles are commonly used at the end of questions. 吧? is used to invite agreement. 呢? is a tag question meaning “, and you?” 吗? is a question particle that is used when one expects a “yes” or “no” response.			

CC LP 12.1.12	Report events in past time using adverbs of time		
Approaching	Attaining	Expanding	
星期一、星期二、星期三、 星期四、星期五、星期六、 星期天(日) seven days of the week 昨天 yesterday 第一、第二、第三..... ordinals: first, second, third...	上个星期 last week 上次 last time 第一次 the first time 以前, 这次,before, this time, ...	上半个星期/月 earlier this week/month 上半天/年 earlier in the day/year	

今天早上 this morning	# 天 (以) 前 # days ago	
三点 three o'clock	过去 in the past	
Noticing and awareness spotlight		
1. Placement of adverbs of time		
Adverbs of time are typically placed either at the beginning of the sentence or after the subject and before the main verb. Adverb placement is also affected by the type of time described. For example, when the adverb of time indicates a specific point in time , e.g., at 3 o'clock, it is positioned after the subject and before the verb . However, when the adverb of time describes an activity that occurs over a more general period of time , e.g., he slept for three hours, then the adverb must be placed after the verb.		
2. Timeline as a vertical (not horizontal) concept		
If we imagine a vertical line to represent past, present, future time, then the Chinese use of the word 上 (literally "above") to represent past time and 下 (literally "below") to indicate future may be easier for English speakers to acquire.		
3. Use of “以”		
# 天 (以) 前 (# days ago): In this adverbial phrase, “以” is optional. 以前 (before): As a conjunction, “以” cannot be omitted.		

CC LP 12.1.13	Negotiate to reach consensus	
Approaching	Attaining	Expanding
好吧。 OK. 我同意。 I agree.	我同意你的想法。 I agree with your idea. 我也一样。 Same here.	不约而同。 We reach the consensus without consulting with each other.
Noticing and awareness spotlight: Use of 吗? 吧? 呢?		
A few particles are commonly used at the end of questions. 吧? is used to invite agreement. 呢? is a tag question meaning “, and you?” 吗? is a question particle that is used when one expects a “yes” or “no” response.		

Learning Activity 2

1. Lead a “Show and Tell” review of model membrane materials. On page 2 of MMIC 12-IWB, display photos taken during the Lesson 11 “Materials Testing” activity. Make sure there is one good photo of student “scientists” working with each of the six model membrane materials. While viewing each photo, ask students to briefly discuss together in groups their response to three questions. Display these questions on page 3-4 of MMIC 12-IWB.

中文	English
这是什么材料? (如果需要, 可以用每种材料的样品)	What is the material called? <i>(Use samples of each material to support this step, if needed.)</i>
这个材料有什么特点? (在白板上有多多个特点让学生选择)	Which characteristics describe it? <i>(Have a list of characteristics listed on the whiteboard to choose from.)</i>
通过实验你学到了关于这种材料的哪些知识? (复习这个句型: “我学到了 ____ 可能管用/不管用, 因为.....”)	What did you learn about this material from the materials testing experiment? <i>Review the sentence frame “We learned that ____ might work well/might not work well because it is/it has...”</i>

2. After groups have discussed the three questions for the first photo, invite various students to orally respond to the three questions above for that photo. Continue in this manner until groups and whole class have discussed answers to the three questions for each of the six testing materials photos.
3. Display the comparison chart that was created during Lesson 10, Learning Activity 3, showing the relationship between scientists and engineers. On page 5 of MMIC 12-IWB, recreate the comparison chart that the class created during Lesson 10. Call attention to the following key point:

中文	English
在设计模型的时候, 工程师会运用科学实验的结果来帮助他们。	Engineers use results from scientific experiments to help them as they design their models.

4. Have students return to the same working groups that they had during Lesson 11. Display the following question on page 6 of MMIC 12-IWB and allow student groups time to discuss what they have learned from the science experiments that they have done during this unit:

中文	English
在葡萄干的实验中，你们学到了关于薄膜的那些知识？	What have you learned about membranes from the raisin experiment?
在测试材料的实验中，关于各种可以用来制作薄膜模型的材料，你们学到了什么？	What have you learned from the testing materials experiment about various materials that you could use for making a model membrane?

5. Allow volunteers to share what they have learned so far.
6. Tell students that today, their groups will do the work of bioengineers—just like Ms. Peters and Juan Daniel. Display the following instructions for this design challenge on page 7 of MMIC 12-IWB:

中文	English
从这六种材料中选出一些材料做一个薄膜模型，让水慢慢地 <u>滴</u> 到容器底部的塑料青蛙上。 <i>(Note: Be sure to highlight the vocabulary for “drip” for the students: 滴)</i>	Choose from these six materials to create a model membrane that will slowly drip water to the plastic frog at the bottom of this container. <i>Note: Show a picture of a sample model membrane on page 8 of MMIC 12-IWB.</i>
你们可以用各种方法 <u>组合</u> 这六种材料。 <i>(Note: 组合 may be difficult for students; give word hints: 组 means group, 合 means together)</i>	Combine these materials in any way you think would work.
把这些材料剪成适合放在容器里的大小，而且可以盖上盖子。	Cut the materials as needed to fit into the container. All of your materials must fit into the container with the lid on.
向薄膜模型里倒 1/2 杯（118.3 毫升）的水。	Pour ½ cup (118.3 ml) of water onto your model membrane. <i>Note: This is a great opportunity to reinforce the math concept of measuring volume.</i>
24 小时以后，看看多少水通过薄膜滴到杯底。 [杯底必须少于 1/4 杯的水 (59.1 毫升) 才算成功]	24 hours later, see how much water has dripped through. (Success = 1/4 cup (59.1 ml) or less in 24 hours.)

7. Allow students time to ask some questions about what will be expected of them, and let them know that they will be closely guided through the steps, yet given the chance to be creative with the model membrane materials.

Language Function-Form-Vocabulary Connections (Activity 2)	
CO LP 12.2.1	Use a developing understanding of basic units of word formation in Chinese to infer and construct meaning with written text
Form focus: radical → character → compound/word	
1. radical	
<p>A radical is the smallest meaningful orthographic unit in compound characters, for example, 虫 (insect) is used in the character 蛙 (frog). 虫 (insect) can also be a stand-alone character. There are three types of radicals: semantic (give information about character meaning) [手 (hand)], phonetic (give information about character pronunciation) [分 (fen) in the compound 纷 (one after another)], and perceptual (do not give information about character meaning or pronunciation, instead function as visual fillers) [此 (this, these in classical Chinese), however, in the compound 嘴 (mouth) the radical 此 functions as a perceptual radical providing information about neither meaning nor pronunciation].</p>	
2. character	
<p>A Chinese character is a meaningful orthographic unit that is always pronounced as one syllable. Chinese characters have evolved as a writing system over millennia and have developed in various ways.</p> <p>Some characters are pictographs that were originally drawings of concrete objects, for example, 雨 (rain), the four dots depicting the rain coming down from the sky; others are better described as ideographs because they were created as graphic representations of more abstract ideas such as the notion of “above”, 上, the stroke above the horizontal line indicating the idea of “above” or “up.” Another way to create characters was to combine two or more pictographs or ideographs to portray a new meaning, for example, 休 (to rest), a combination of the pictographs for person, 人, and a person leaning against a tree, 木. These types of characters are referred to as ideogrammatic characters.</p> <p>Over 90% of Chinese characters were created as phono-semantic compound characters and are made up of a combination of semantic and phonetic radicals. For example, 控 (to control), the semantic radical on the left side, 手 (hand), indicates that the word meaning will include an action with a hand, and the phonetic radical on the right side 空 (kōng), helps the reader with character pronunciation “kòng.”</p>	
3. compound	
<p>Compounds consist of at least two characters, neither of which is an affix, a character that on its own lacks meaning but when added to other characters becomes a meaningful unit. Most Chinese words are compounds. Compounds have various types of syntactic relationships.</p> <p>A few compound types:</p> <p><i>Verb-Object:</i> 踢足球 (to kick soccer ball)、开球 (to kick of)、发誓 (to pledge)</p> <p><i>Verb-Complement:</i> 摔倒 (to fall down)、改进 (to improve and get better)、进来 (to come in)</p> <p><i>Subject-Predicate:</i> 天亮 (bright [sky is bright])</p> <p><i>Number-Classifier:</i> 各种 (various kinds)、一道 (a ray of...)、一片 (a patch of...)</p>	

<p>Adverb-Verb: 慢跑 (to jog [to run slowly])、快走 (to hurry [to walk fast]) Verb-Verb-Noun: 栖息地 (habitat [to stay and rest at a place]) Adjective-Adjective-Noun: 浅桃色 (light peach color)、吉祥物 (mascot [happy and auspicious object])</p>
4. word
<p>A word is written with one or more Chinese characters. A word can consist of a single character (脚, foot), a compound (幸运, lucky), a duplicate (招招手, to wave), or an affixed form (第一, first, 第二, second, etc.).</p>

CO LP 12.2.2	Report about things, actions, or events in past time using action verbs with 了 (temporal marker) and adverbs of time	
For example:		
Approaching	Attaining	Expanding
<p>我们发现了……不管用。 We found ... did not work well.</p>	<p>当我们测试尼龙纱窗布的时候，我们看见了水穿过得很快。 When we tested the nylon screen, we saw that water passed through it quickly.</p>	<p>经过测试有一个孔的铝箔纸后，我/我们发现了水流得很快。 After testing the aluminum foil with one hole, I/we found that it made the water flow slowly.</p>
<p>我们学到了葡萄干吸收水。 We learned that a raisin absorbs water.</p>	<p>在葡萄干的实验中，我们学到了薄膜可以让水通过。 In the raisin experiment, we learned that a membrane can let water pass through.</p>	<p>在葡萄干的实验中，我们学到了薄膜可以让水通过，也可以阻挡沙。 In the raisin experiment, we learned that a membrane can let some things pass through and block other things.</p>
<p>Simple past time using action verb with temporal marker 了</p>	<p>Use of dependent time phrase in complex sentence and temporal marker 了</p>	<p>Use of dependent time clause in complex sentence and temporal marker 了</p>
Form focus		
1. Use of 了 as temporal marker		
<p>Simple past time can be communicated using 了 (temporal marker), e.g., action verb + 了 (temporal marker). The temporal marker “了” is positioned either immediately after the main verb or at the end of the sentence/clause.</p>		

2. Use of dependent time phrase/clause in complex sentence

Mandarin uses prepositions as linking words to connect two clauses and form one complex sentence. When the first clause is dependent on the second clause to complete its meaning, prepositions will be placed at the end of the first clause. The first clause may consist of a time phrase [noun + preposition] (e.g., 足球比赛的时候,) or a time clause [simple SVO sentence + preposition] (e.g., 当我们测试尼龙纱窗布的时候,).

For example,

Noun/simple SVO sentence + 以后 (after), + main clause.

Noun/simple SVO sentence + 以前 (before), + main clause.

Noun/simple SVO sentence + 的时候 (when/while at), + main clause.

Noticing and awareness spotlight

1. Use of temporal marker “了” with “verb + verb complement” structure

When a two-character “verb + verb complement” structure is used, the temporal marker “了” must be placed after the verb complement.

For example,

[我] 看到了。(I saw.)

However, if the verb complement consists of two characters instead of just one, then “了” can be placed either after the one-character first main verb or after the two-character verb complement.

For example,

他走了出来。(He walked out of there.)

他走出来了。(He walked out of there.)

2. Use of particles 的、地、得

的 (de) is used when an adjective and/or a pronoun modifies a noun. The form is:
Adj./pron. + 的 + Noun, for example, 炎热的夏天 (sweltering summer), 我们的薄膜模型 (our model membrane design)

地 (de) is used when an adverb modifies a verb. The form is:
Adv. + 地 + Verb (unlike in English!), for example, 高兴地欢呼 (cheer happily)

得 (de), as a potential complement, is used as a complement to further describe a main verb/adjective. It is placed after the verb/adjective it describes. The form is:
Verb/adjective + 得 + degree complement

The degree complement can be made up of an adverb or a noun phrase.

For example,

我跑得快。(I ran fast.) (得 + adverb as degree complement)

薄膜有一些小得眼睛都看不见的孔。(Membranes have holes that are too small to see.)

(得 + noun phrase as degree complement)

CO LP 12.2.3	Support ideas/opinions using compound sentences with adverb 因此		
For example:			
	Approaching	Attaining	Expanding
	海绵是不管用的，因为它太厚了。	海绵太厚了，水不能通过，因此，我们认为海绵是不管用的。	由于毡布不能让水一滴一滴地滴下来，因此，我们认为毡布是不管用的。
	The sponge does not work well, because it is too thick.	The sponge is too thick and it does not allow water to pass through, as a result, we think a sponge does not work well.	Due to the fact that the felt cannot let water drip through, as a result, we think it does not work well.
, 因为 (because)..... 因为 (because)....., 所以 (so)....., 因此 (as a result, therefore),	由于 (due to)....., 因此 (as a result, therefore),
Form focus:, 因此 (as a result, therefore),			
因此 (as a result, therefore) is an adverb that can be used instead of the conjunction 因为 in the second clause.			
Noticing and awareness spotlight			
1. Use of 由于 (due to)			
由于 (due to)....., reflects a more formal register and is more likely to be used in written communication.			
2. Simple descriptive sentence (Subj. + 是 + adj. +的)			
The “是 + adj. +的” structure is commonly used to describe something or someone. For example, 海绵是不管用的。(The sponge does not work.)			

CO LP 12.2.4	State use/function of someone using nominalization and purpose verb phrase, 来 + verb + object		
	Approaching	Attaining	Expanding
	科学家用科学方法验证假设。	科学家是用科学方法来验证假设的。	科学家需要用科学方法来验证假设。
	A scientist uses the Scientific Method to test a hypothesis.	A scientist uses the Scientific Method to test a hypothesis.	A scientist needs to use the Scientific Method to test a hypothesis.

<p>Subj. + Verb₁ + Object₁ + Verb₂ + Object₂ [Verb₁ and Verb₂ are parallel verbs. They are both actions performed by the same Subj.]</p>	<p>Subj. + Verb 是 + nominalization [Verb₁ 用 + pronoun + 的 + Object₁ + 来 + Verb₂ + Object₂ + 的].</p>	<p>Subj. + Verb₁ 需要 + Verb₂ 用 + Object₁ + purpose verb phrase [来 + Verb₃ + Object₃]</p>
Form focus		
1. Multiple uses of 来		
<ol style="list-style-type: none"> “来” as an action verb, meaning “to come”. e.g., 他昨天来过两次。(He came twice yesterday.) “来” is used to replace the verb in previous sentence. e.g., 把这杯茶喝完, 我们再来一瓶! (Drink up this cup of tea, we will drink another!) “来” is placed in front of a verb phrase, indicating purpose. e.g., Juan Daniel 需要水杯来喝水。(Juan Daniel needs a water bottle to drink water.) “来” is used to indicate the direction of an action verb. e.g., 你把那本书拿来! (Bring that book over here!) 		
2. Nominalization using 的		
<p>A verb/verb phrase can become a noun by placing the particle 的 (de) after it. For example, the verb phrase 你说 (you say) can function as a noun phrase 你说的, meaning “what you say” in 你说的是 (What you say is...).</p> <ul style="list-style-type: none"> If the subject is expressed in the verb phrase 你说 (you say), it is likely that the noun phrase, 你说的 (what you say), will function as the direct object in the sentence, in this case, the “what” you say. <p>If the direct object is expressed in the verb phrase, e.g., 种水果 (grow fruit), it is likely that the noun phrase, 种水果的, will function as the subject of the sentence, as that is the information that is lacking.</p>		

CO LP 12.2.5	Predict degree of probability of something using auxiliary “helping” verbs	
For example:		
Approaching	Attaining	Expanding
<p>我想海绵可能管用。</p> <p>I think a sponge is likely to work well.</p>	<p>我觉得/想海绵应该(不)管用。</p> <p>I feel like/think that a sponge ought to (not) work well.</p>	<p>[根]据我的观察, 我觉得/想海绵在我们的薄膜模型中应该管用。</p> <p>Due to my observations, I think a sponge could work well in our model membrane design.</p>

Use of adverb “可能” to express future possibility.	Use of auxiliary 应该 + adjectival verb 管用.	Use of adverb of time phrase, subj. + verb + object complement (object + 在+ locative phrase + auxiliary 应该 + adjectival verb 管用).
Form focus		
1. Auxiliary “helping verbs”		
<p>In Mandarin, auxiliary “helping verbs” indicate the ability, possibility, intention or desire to carry out an action. The following are examples of auxiliary “helping verbs”: 会 ‘will likely + verb’, 会 ‘will know + verb’, 能/可以 ‘able to + verb’, 要/应该 ‘ought to + verb’, 要/想 ‘want to + verb’, 可以 ‘allow to + verb’, 不可以 ‘prohibited to + verb’</p>		
2. How auxiliary “helping verbs” are same/different from other verbs		
<p>Like other verbs, auxiliary verbs...</p> <ul style="list-style-type: none"> a. occur as the A element in A-not-A questions, for example, 薄膜的孔应该不应该很小? (Should the holes of a membrane be small?); b. can be negated, or example: 薄膜的孔不应该很大。 (The holes of a membrane should not be big.) <p>Unlike other verbs, auxiliary verbs ...</p> <ul style="list-style-type: none"> a. must co-occur with a verb or an assumed verb; For example, 薄膜的孔应该不应该很小? (Should the holes of a membrane be small?) b. does not take aspect markers such as 了(le), 过(guò), 着(zhe); c. cannot be modified by intensifiers, such as 很(very) or 更(even more); d. cannot be nominalized; e. cannot occur before the subject; f. cannot take a direct object. 		
Noticing and awareness spotlight: Placement of locative phrase		
<p>Unlike in English, a locative phrase is placed either at the beginning of the sentence or before the main verb, NOT at the end of the sentence. A locative phrase, e.g., “在 zai + concrete noun +locative particle,” can be placed in a sentence as follows:</p> <ol style="list-style-type: none"> 1. Directly before the main verb. (typical placement) 我觉得／想海绵在我们的薄膜模型中应该 管用。 I think a sponge could work well in our model membrane design. (Subj. + verb + object complement (object + 在+ locative phrase + auxiliary 应该 + adjectival verb 管用). 2. At the beginning of the sentence and set off by a comma. (for emphasis) 在咖啡过滤纸上, 我们放了一块海绵。 On the coffee filter, we put a sponge. (Locative phrase, subj + verb + past tense marker + object.) 3. After main verb in a 把-construction (giving emphasis to the direct object) 我们把一块海绵放在咖啡过滤纸上了。 We placed a sponge on the coffee filter. (Subj + 把-construction [把 + object + verb + complement] + past tense marker.) 		

CO LP 12.2.6	Predict cause-effect relationship using hypothetical conditional sentences with 如果/要是....., (那么)..... and the adjectival verb 可能		
Approaching	Attaining	Expanding	
我想有孔的铝箔纸可能更好。它会阻挡太多的水通过。 I think the aluminum foil with one hole is perhaps better. It will block some water from passing through.	如果/要是你们用咖啡过滤纸代替海绵, 我觉得更多的水可能会通过。 If you use coffee filters instead of the sponge, then I think more water may pass through.	如果/要是你们用咖啡过滤纸代替海绵, 我觉得薄膜模型的效果可能会更好, 因为咖啡过滤纸比海绵能少吸收水分。 If you use coffee filters instead of the sponge, then I think the model membrane may work better, because coffee filters absorb less water than a sponge.	
可能 (maybe, perhaps)	要是/如果.....,(可能).....	要是/如果.....,(可能)....., 因为.....	
Form focus: 要是/如果.....,(可能).....			
The hypothetical conditional sentence structure consists of two parts: <ul style="list-style-type: none"> • The If-clause (要是/如果) expressing the conditional hypothesis • The main clause expressing the respective result; usually contains adverb “perhaps/maybe” (可能) 			
Noticing and awareness spotlight: Difference between 能 and 会			
能 and 会 are both auxiliary verbs meaning “can” or “may.” They are used interchangeably. However, there is a difference between them: 会 (huì) specifies a learned, acquired skill or a mental ability; 能 (néng) means having the physical ability or opportunity to do something unless a condition prevents it. For example: 我会游泳, 可是我今天不能游泳, 因为我的腿受伤了。 I can swim, but I cannot today, because my leg is injured.			

CO LP 12.2.7	State quantities of materials using numbers and appropriate classifiers
For example: 一张铝箔纸 (a piece of aluminum foil) 五张咖啡过滤纸 (five coffee filters) 三块纱布 (three pieces of cheesecloth) 两块海绵 (two sponges)	

Approaching	Attaining	Expanding
个 (gè) people and general object 家 (jiā) families and business establishments 件 (jiàn) clothing 棵 (kē) plants 只 (zhī) insects and animals 支 (zhī) rod-shaped objects, e.g., pencil, Chinese paint brush 把 (bǎ) small objects and objects with a handle, e.g., scissors, chair 本 (běn) journals, books and files	张 (zhāng) thin and flat objects, e.g., aluminum foil, coffee filter 块 (kuài) pieces of small things, e.g., felt, sponge 位 (wèi) persons of status, e.g., professor, engineer 碗 (wǎn) things that come in bowls mostly, e.g., noodles, rice, water 场 (chǎng) events and happenings such as episode, e.g., soccer game	滴 (dī) a drop/a drip used for liquid items 对 (duì) couple/pair: modifies anything that comes in pairs 架 (jià) planes and large vehicles and a few smaller electric objects such as radios
Form focus: Number + Classifier + Object (noun)		
Classifiers are used when counting objects (nouns). Almost all nouns have a corresponding classifier. When learning a noun it is always good to learn its classifier.		
Noticing and awareness spotlight		
1. The difference between 二 and 两		
二	两	
1) Counting: e.g., 一、二、三..... 2) Used in ordinal numbers: e.g., 第一 (first)、第二 (second)、第三 (third) 3) As last part of any higher number that ends in two: e.g., 十二 (12)、八十二 (82)	Used whenever a classifier is used to indicate “two of something”, see: Subj. + Verb + 两 + Classifier + Noun	
2. The difference between 只 and 支		
只 (zhī)	支 (zhī)	
只 is used for insects and animals.	支 is used for rod-shaped objects.	
These two classifiers are homophones. They have the same pronunciation but different uses and meanings.		

CO LP 12.2.8	Suggest an alternative idea using serial verb construction with pivotal noun phrase	
Approaching	Attaining	Expanding
我们要用有小孔的铝箔纸。我们不要用海绵。	我们要用咖啡过滤纸代替有小孔的铝箔纸。	为什么不用毡布代替尼龙纱窗布？

We should use the aluminum foil with tiny holes. We should not use the sponge.	We should use the coffee filter instead of the aluminum foil with tiny holes.	Why don't we use the felt instead of the nylon screen?
Parallel SVO sentence construction used to first confirm and then disconfirm.	Subj. + auxiliary + Verb ₁ + (Object ₁ / Subj ₂) + Verb ₂ + Object ₂ .	为什么不 (why not) + Verb ₁ + (Object ₁ / Subj ₂) + Verb ₂ + Object ₂ ?
Form focus: Subj. + Verb ₁ + Object ₁ + Verb ₂ + Object ₂		
<p>A serial verb construction refers to a sentence with two or more verbs that are connected by one and the same event. One type of serial verb constructions is called the pivotal construction. A pivotal construction contains a noun phrase (Object₁ / Subj₂) that “pivots” between functioning as the object of Verb₁ and the subject of Verb₂.</p> <p>An example: 设计薄膜模型的时候，我们用海绵代替咖啡过滤纸。 (When designing the model membrane, we used the sponge instead of the coffee filter.)</p>		
Noticing and awareness spotlight: Use of 没(有)		
<p>The negative particle 没(有) is also used to indicate that an action DID NOT happen in the past; “不 (bù) + verb” is used to indicate that an action DOES NOT happen in the present or WILL NOT happen in the future.</p> <p>For example:</p> <ol style="list-style-type: none"> 我不吃早饭。I don't eat breakfast. (habit) 我没吃早饭。I haven't eaten breakfast. 		

CC LP 12.2.9	State what/who something is	
For example:		
Approaching	Attaining	Expanding
这(不)是毡布。 This is/is not felt.	这个材料(不)是毡布。 This material is/is not felt.	这个材料(不)是一块毡布。 This material is/is not a piece of felt.
他们可以搭配。 They can (not) match.	这个汉字和那个材料可以搭配。 This character and that material can (not) match.	这个汉字和那个材料可以搭配成一对。 This character and that material do not make a pair.

Form Focus: Number + Classifier + Object (noun)
<p>Classifiers are used when counting objects (nouns). Almost all nouns have a corresponding classifier. When learning a noun it is always good to learn its classifier.</p> <p>If you identify the number of specific objects (e.g., 这是一架飞机。This is an airplane.), you will need to use the classifier. However, if the number of objects is not specified, the classifier will not be used. For example, 这是鹦鹉的喙。This is a parrot's beak.</p>

CC LP 12.2.10	Express a personal opinion		
Approaching	Attaining	Expanding	
我觉得／想 I feel like/think... 也许／可能 (maybe, perhaps)	在我看来..... It seems to me like... 对我来说, In my opinion, ... 我认为..... I believe/think ...	我建议..... I suggest... 我的看法是..... My thoughts are... 我是说..... What I mean is...	

CC LP 12.2.11	Ask for clarification about feedback/advice/idea		
For example:			
Approaching	Attaining	Expanding	
你说什么? What did you say? 我不懂。 I didn't understand that. 什么意思? What does it mean?	我没听懂, 请你再说一次。 I didn't understand, could you please say it again? 你是不是说..... Did you say... 你说的是.....的意思吗? Does what you said mean...?	你可不可以重复一遍? Could you repeat it one more time? 请你再跟我讲一讲。 Please explain it to me one more time. 你可以给我解释一下吗? Could you explain that to me?	
Form focus: Nominalization using 的 (e.g., 你说的是.....)			
A verb/verb phrase can become a noun by placing the particle 的 (de) after it. For example, the verb phrase 你说 (you say) can function as a noun phrase 你说的, meaning "what you say" in 你说的是 (What you say is...).			

Noticing and awareness spotlight: Use of 吗? 吧? 呢?
<p>A few particles are commonly used at the end of questions.</p> <p>吧? is used to invite agreement.</p> <p>呢? is a tag question meaning “..., and you?”</p> <p>吗? is a question particle that is used when one expects a “yes” or “no” response.</p>

CC LP 12.2.12	Express agreement/disagreement		
Approaching	Attaining	Expanding	
<p>好。 Good.</p> <p>我同意。 I agree.</p> <p>我也是 / 同意。 I also + verb (am/agree).</p> <p>对。 Exactly/Correct.</p>	<p>你说得对。 You are correct.</p> <p>你完全正确。 You're absolutely right.</p> <p>我也是这么认为的。 I think so too.</p> <p>我也不这么认为。 I don't think so either.</p>	<p>我的想法跟你的一样。 I share your thoughts.</p> <p>我赞成。 I agree (more formal).</p> <p>我完全赞同。 I agree with you entirely.</p>	
<p>不。 No.</p> <p>不好。 Not good.</p> <p>不同意。 I don't agree with you.</p> <p>不对。 Not exactly.</p>	<p>我不是这么认为的。 I don't think so.</p> <p>是, 可是你不觉得.....? Yes, but don't you think...</p> <p>我觉得我不同意。 I'm afraid I have to disagree.</p>	<p>我的意见跟你的不同。 My suggestions are different from yours.</p> <p>我想和你讨论讨论..... I must take issue with you on that.</p> <p>然而 However</p>	

Noticing and awareness spotlight: Repetition of verb
<p>Repetition of a verb, e.g., 讨论讨论 (to discuss), can be used to soften the tone of voice.</p>

CC LP 12.2.13	Negotiate to reach consensus	
Approaching	Attaining	Expanding
<p>好吧。 OK.</p> <p>我同意。 I agree.</p>	<p>我同意你的想法。 I agree with your idea.</p> <p>我也一样。 Same here.</p>	<p>不约而同。 We reach the consensus without consulting with each other.</p>

Focused Learning Phase-- “Through” activities

Students will complete the “Ask,” “Imagine,” “Plan,” and “Create” steps in the Engineering Design Process.

Time: Learning Activity 3—20 minutes
Learning Activity 4—30 minutes
Learning Activity 5—40 minutes
Learning Activity 6—40 minutes

Note: Read “Part 1: Preparation”, page 101 in the *EiE*[®] binder, before beginning this part of the lesson. This page contains important information on how to set up the experiment.

Teaching Tips for *EiE*[®] “Part 1: Preparation,” page 101:

- For Step 6: It works best to keep the water pitcher near the bins. As the groups bring their finished models to the bins, help students measure the water into the measuring cup and pour the water on the model.
- For Step 7: We recommend not making a packet of handouts. Instead, distribute handouts as they are needed for each part of the lesson. This will help students focus their attention on the correct handout for each activity.
- Set up the teacher materials table, bins and water pitcher before class begin.

Learning Activity 3

1. Assign jobs to the members of each group:

中文督察员 (Chinese Champion)

- Encourages use of Chinese only
- Assists group members with correct word/phrase as needed

记录员 (Remarkable Recorder)

- Writes or draws group responses

材料管理员 (Magnificent Materials Manager)

- Picks up and distributes handouts and materials to group

工作管理员 (Terrific Taskmaster)

- Helps group manage time/task well
- Makes sure each group member has a turn to speak

2. On page 10 of MMIC 12-IWB, show the graphic from MMIC 10-3 (*EiE*[®] {4-1}): *Engineering Design Process* but hide the names of the steps of the process from student view.

3. Ask the class what the first step is in the Engineering Design Process, 提问 (*Ask!*). Uncover the circle on the whiteboard and display the characters for this step.
4. Distribute MMIC 12-2 (EiE® {4-4}): *Designing a Model Membrane: Ask!*, one per group. Tell students that they will complete this handout with their groups, recalling the important questions that they have already asked about their model membranes. 工作管理员 (**Terrific Taskmaster**) will be sure each group member has a turn to speak, and 记录员 (**Remarkable Recorder**) will write the group's answers on the handout.
5. When ready, ask groups to share some of their answers. Ask groups to place their completed handout into a folder so that they can refer to it later in the design process, as needed.

Language Function-Form-Vocabulary Connections (Activity 3)		
CO LP 12.3.1	Predict degree of probability of something using auxiliary “helping” verbs	
For example:		
Approaching	Attaining	Expanding
我想海绵可能管用。 I think a sponge is likely to work well.	我觉得／想海绵应该(不)管用。 I feel like/think that a sponge should (not) work well.	[根]据我的观察，我觉得／想海绵在我们的薄膜模型中应该管用。 Due to my observations, I think a sponge should work well in our model membrane design.
Use of adverb “可能” to express future possibility.	Use of auxiliary 应该 + optional negation particle 不 + adjectival verb 管用.	Use of adverb of cause phrase, subj. + verb + object complement (object + 在+ locative phrase + auxiliary 应该 + adjectival verb 管用).
Form focus		
1. Auxiliary “helping verbs”		
In Mandarin, auxiliary “helping verbs” indicate the ability, possibility, intention or desire to carry out an action. The following are examples of auxiliary “helping verbs”: 会 ‘will likely + verb’, 会 ‘will know + verb’, 能/可以 ‘able to + verb’, 要/应该 ‘ought to + verb’, 要/想 ‘want to + verb’, 可以 ‘allow to + verb’, 不可以 ‘prohibited to + verb’		
2. How auxiliary “helping verbs” are same/different from other verbs		
Like other verbs, auxiliary verbs... a. occur as the A element in A-not-A questions, for example, 薄膜的孔应该不应该很小? (Should the holes of a membrane be small?); b. can be negated, or example: 薄膜的孔不应该很大。(The holes of a membrane should not be big.)		
Unlike other verbs, auxiliary verbs ... a. must co-occur with a verb or an assumed verb; For example, 薄膜的孔应该不应该很小? (Should the holes of a membrane be small?) b. does not take aspect markers such as 了(le), 过(guò), 着 zhe; c. cannot be modified by intensifiers, such as 很 (very) or 更 (even more); d. cannot be nominalized; e. cannot occur before the subject; f. cannot take a direct object.		

Noticing and awareness spotlight: Placement of locative phrase
<p>Unlike in English, a locative phrase is placed either at the beginning of the sentence or before the main verb, NOT at the end of the sentence.</p> <p>A locative phrase, e.g., “在 zai + concrete noun +locative particle,” can be placed in a sentence as follows:</p> <ol style="list-style-type: none"> 1. Directly before the main verb. (typical placement) 我觉得／想海绵在我们的薄膜模型中应该管用。 I think a sponge could work well in our model membrane design. (Subj. + verb + object complement (object + 在+ locative phrase + auxiliary 应该 + adjectival verb 管用). 2. At the beginning of the sentence and set off by a comma. (for emphasis) 在咖啡过滤纸上，我们放了一块海绵。On the coffee filter, we put a sponge. (Locative phrase, subj + verb + past tense marker + object.) 3. After main verb in a 把-construction (giving emphasis to the direct object) 我们把一块海绵放在咖啡过滤纸上了。We placed a sponge on the coffee filter. (Subj + 把-construction [把 + object + verb + complement] + past tense marker.)

CO LP 12.3.2	Predict cause-effect relationship using hypothetical conditional sentences with 如果/要是……, (那么)…… and the adjectival verb 可能		
Approaching	Attaining	Expanding	
我想有孔的铝箔纸 可能 更好。它会阻挡太多的水通过。	如果/要是 我们用咖啡过滤纸，我觉得更多的水可能会快速地通过。	如果/要是 我们用咖啡过滤纸，我觉得薄膜模型可能会让水通过得更快。	
I think the aluminum foil with holes is perhaps better. It will block too much water from passing through.	If we use coffee filters, then I think water will pass through quickly.	If we use coffee filters, then I think the model membrane will let water pass through quickly.	
可能 (maybe, perhaps)	要是／如果……, ……(可能)……	要是／如果 ……, ……(可能)……	
Form focus			
1. 要是／如果……, ……(可能)……			
<p>The hypothetical conditional sentence structure consists of two parts:</p> <ul style="list-style-type: none"> • The If-clause (要是/如果) expressing the conditional hypothesis • The main clause expressing the respective result; usually contains adverb “perhaps/maybe” (可能) 			

2. Use of 让/使-construction
Similar to “把-sentence,” the “让/使-construction” allows one to place the direct object in front of the main verb, which is not typical word order in Chinese. This draws more attention to what is happening to the object itself.
Noticing and awareness spotlight
1. Difference between 能 and 会
能 and 会 are both auxiliary verbs meaning “can” or “may.” They are used interchangeably. However, there is a difference between them: 会 (huì) specifies a learned, acquired skill or a mental ability; 能 (néng) means having the physical ability or opportunity to do something unless a condition prevents it. For example: 我会游泳，可是我今天不能游泳，因为我的腿受伤了。 I can swim, but I cannot today, because my leg is injured.
2. Use of particles 的、地、得
的 (de) is used when an adjective and/or a pronoun modifies a noun. The form is: Adj./pron. + 的 + Noun, for example, 炎热的夏天 (sweltering summer), 我们的薄膜模型 (our model membrane design)
地 (de) is used when an adverb modifies a verb. The form is: Adv. + 地 + Verb (unlike in English!), for example, 高兴地欢呼 (cheer happily)
得 (de), as a potential complement, is used as a complement to further describe a main verb/adjective. It is placed after the verb/adjective it describes. The form is: Verb/adjective + 得 + degree complement
The degree complement can be made up of an adverb or a noun phrase. For example, 我跑得快。(I ran fast.) (得 + adverb as degree complement) 薄膜有一些小得眼睛都看不见的孔。(Membranes have holes that are too small to see.) (得 + noun phrase as degree complement)

CO LP 12.3.3	Suggest an alternative idea using serial verb construction with pivotal noun phrase	
Approaching	Attaining	Expanding
我们要用有小孔的铝箔纸。我们不要用海绵。	我们要用咖啡过滤纸代替有小孔的铝箔纸。	为什么不用毡布代替尼龙纱窗布？

We should use the aluminum foil with tiny holes. We should not use the sponge.	We should use the coffee filter instead of the aluminum foil with tiny holes.	Why don't we use the felt instead of the nylon screen?
Parallel SVO sentence construction used to first confirm and then disconfirm.	Subj. + auxiliary + Verb ₁ + (Object ₁ / Subj ₂) + Verb ₂ + Object ₂ .	为什么不 (why not) + Verb ₁ + (Object ₁ / Subj ₂) + Verb ₂ + Object ₂ ?
Form focus: Subj. + Verb ₁ + Object ₁ + Verb ₂ + Object ₂		
<p>A serial verb construction refers to a sentence with two or more verbs that are connected by one and the same event. One type of serial verb constructions is called the pivotal construction. A pivotal construction contains a noun phrase (Object₁ / Subj₂) that “pivots” between functioning as the object of Verb₁ and the subject of Verb₂.</p> <p>An example: 设计薄膜模型的时候，我们用海绵代替咖啡过滤纸。 (When designing the model membrane, we used the sponge instead of the coffee filter.)</p>		

CO LP 12.3.4	Support ideas/opinions using compound sentences with adverb 因此	
For example:		
Approaching	Attaining	Expanding
我们猜.....，因为它有.....	纱布有很多孔，因此，我们推测.....	由于尼龙纱窗布上有很多小孔，因此，我们推测.....
We predict...., because it has ...	Cheesecloth has many holes, as a result, we predict...	Due to the many tiny holes on the nylon screen, as a result, we predict.....
海绵是不管用的，因为它太厚了。	海绵太厚了，水不能通过，因此，我们认为海绵是不管用的。	由于毡布不能让水一滴一滴地滴下来，因此，我们认为毡布是不管用的。
The sponge does not work well, because it is too thick.	The sponge is too thick and it does not allow enough water to pass through, as a result, we think a sponge does not work well.	Due to the fact that the felt lets water drip through slowly, as a result, we think it works well.
....., 因为 (because)..... 因为 (because)....., 所以 (so)....., 因此 (as a result, therefore),	由于 (due to)....., 因此 (as a result, therefore),

Form focus:, 因此 (as a result, therefore),
因此 (as a result, therefore) is an adverb that can be used instead of the conjunction 因为 in the second clause.
Noticing and awareness spotlight
1. Use of 由于 (due to)
由于 (due to)....., reflects a more formal register and is more likely to be used in written communication.
2. Simple descriptive sentence (Subj. + 是 + adj. +的)
The “是 + adj. +的” structure is commonly used to describe something or someone. For example, 海绵是不管用的。(The sponge does not work.)

CO LP 12.3.5	Give emphasis to the specific direct object by using 把 or 让/使 construction and placing the direct object before the verb	
Approaching	Attaining	Expanding
我的薄膜模型阻挡有害的东西在外面。 My model membrane blocks/stops harmful things outside.	我的薄膜模型应该（不）让水通过。 My model membrane should (not) let water pass through.	我的薄膜模型应该（不）让水慢慢地通过。 My model membrane should (not) let water pass through slowly.
Subj. + Verb + Object + Complement (adv.) .	Subj. +让/使-construction [让/使 + direct object + verb], such as, ...	Subj. + 让/使-construction [让/使 + direct object + verb], such as, ...
Form focus: Use of 让/使-construction		
Similar to “把-sentence,” the “让/使-construction” allows one to place the direct object in front of the main verb, which is not typical word order in Chinese. This draws more attention to what is happening to the object itself.		

CO LP 12.3.6	Use a developing understanding of basic units of word formation in Chinese to infer and construct meaning with written text
Form focus: radical → character → compound/word	
1. radical	
A radical is the smallest meaningful orthographic unit in compound characters, for example, 虫 (insect) is used in the character 蛙 (frog). 虫 (insect) can also be a stand-alone character. There are three types of radicals: semantic (give information about character meaning) [手 (hand)], phonetic (give information about character pronunciation) [分 (fen) in the	

<p>compound 纷 (one after another)], and perceptual (do not give information about character meaning or pronunciation, instead function as visual fillers) [此 (this, these in classical Chinese), however, in the compound 嘴 (mouth) the radical 此 functions as a perceptual radical providing information about neither meaning nor pronunciation].</p>
<p>2. character</p>
<p>A Chinese character is a meaningful orthographic unit that is always pronounced as one syllable. Chinese characters have evolved as a writing system over millennia and have developed in various ways.</p> <p>Some characters are pictographs that were originally drawings of concrete objects, for example, 雨 (rain), the four dots depicting the rain coming down from the sky; others are better described as ideographs because they were created as graphic representations of more abstract ideas such as the notion of “above”, 上, the stroke above the horizontal line indicating the idea of “above” or “up.” Another way to create characters was to combine two or more pictographs or ideographs to portray a new meaning, for example, 休 (to rest), a combination of the pictographs for person, 人, and a person leaning against a tree, 木. These types of characters are referred to as ideogrammatic characters.</p> <p>Over 90% of Chinese characters were created as phono-semantic compound characters and are made up of a combination of semantic and phonetic radicals. For example, 控 (to control), the semantic radical on the left side, 手 (hand) , indicates that the word meaning will include an action with a hand, and the phonetic radical on the right side 空 (kōng), helps the reader with character pronunciation “kòng.”</p>
<p>3. compound</p>
<p>Compounds consist of at least two characters, neither of which is an affix, a character that on its own lacks meaning but when added to other characters becomes a meaningful unit. Most Chinese words are compounds. Compounds have various types of syntactic relationships.</p> <p>A few compound types:</p> <p><i>Verb-Object:</i> 踢足球 (to kick soccer ball)、开球 (to kick of)、发誓 (to pledge)</p> <p><i>Verb-Complement:</i> 摔倒 (to fall down)、改进 (to improve and get better)、进来 (to come in)</p> <p><i>Subject-Predicate:</i> 天亮 (bright [sky is bright])</p> <p><i>Number-Classifier:</i> 各种 (various kinds)、一道 (a ray of...)、一片 (a patch of...)</p> <p><i>Adverb-Verb:</i> 慢跑 (to jog [to run slowly])、快走 (to hurry [to walk fast])</p> <p><i>Verb-Verb-Noun:</i> 栖息地 (habitat [to stay and rest at a place])</p> <p><i>Adjective-Adjective-Noun:</i> 浅桃色 (light peach color)、吉祥物 (mascot [happy and auspicious object])</p>
<p>4. word</p>
<p>A word is written with one or more Chinese characters. A word can consist of a single character (脚, foot), a compound (幸运, lucky), a duplicate (招招手, to wave), or an affixed form (第一, first, 第二, second, etc.).</p>

CC LP 12.3.7		Express agreement/disagreement		
Approaching		Attaining		Expanding
<p>好。 Good.</p> <p>我同意。 I agree.</p> <p>我也是/同意。 I also + verb (am/agree).</p> <p>对。 Exactly/Correct.</p>		<p>你说得对。 You are correct.</p> <p>你完全正确。 You're absolutely right.</p> <p>我也是这么认为的。 I think so too.</p> <p>我也不这么认为。 I don't think so either.</p>		<p>我的想法跟你的一样。 I share your thoughts.</p> <p>我赞成。 I agree (more formal).</p> <p>我完全赞同。 I agree with you entirely.</p>
<p>不。 No.</p> <p>不好。 Not good.</p> <p>不同意。 I don't agree with you.</p> <p>不对。 Not exactly.</p>		<p>我不是这么认为的。 I don't think so.</p> <p>是，可是你不觉得.....? Yes, but don't you think...</p> <p>我觉得我不同意。 I'm afraid I have to disagree.</p>		<p>我的意见跟你的不同。 My suggestions are different from yours.</p> <p>我想和你讨论讨论..... I must take issue with you on that.</p> <p>然而 However</p>
Noticing and awareness spotlight: Repetition of verb				
Repetition of a verb, e.g., 讨论讨论 (to discuss), can be used to soften the tone of voice.				

CC LP 12.3.8		Negotiate to reach consensus		
Approaching		Attaining		Expanding
<p>好吧。 OK.</p> <p>我同意。 I agree.</p>		<p>我同意你的想法。 I agree with your idea.</p> <p>我也一样。 Same here.</p>		<p>不约而同。 We reach the consensus without consulting with each other.</p>

Noticing and awareness spotlight: Use of 吗? 吧? 呢?
<p>A few particles are commonly used at the end of questions.</p> <p>吧? is used to invite agreement.</p> <p>呢? is a tag question meaning “, and you?”</p> <p>吗? is a question particle that is used when one expects a “yes” or “no” response.</p>

CC LP 12.3.9	Negotiate turn-taking	
For example:		
Approaching	Attaining	Expanding
该我了! My turn! 到你了! Your turn! 下一个是谁? Who's next? 下一个是你吗? Are you the next one?	下一个该轮到谁了? Who is the next? 我觉得该你了。 I think it's your turn. 大家都在等你呢! All of us are waiting for you!	如果你不赶紧, 我们都不能 往下进行。 If you don't hurry, none of us can move on to the next.

Learning Activity 4

1. Draw students' attention to the graphic of the Engineering Design Process on page 10 of MMIC 12-IWB again. Ask the class what the second step is in the Engineering Design Process, *思考 (Imagine!)*. Uncover the second step and display the characters. Now refer to the steps on page 105 of the EiE® binder and lead the class through Steps 1 and 2 using MMIC 12-3 (EiE® {4-5}): *Designing a Model Membrane: Imagine!*, one copy per student.
2. Ask 材料管理员 (**Magnificent Materials Managers**) to pick up one copy of MMIC 12-3 (EiE® {4-5}): *Designing a Model Membrane: Imagine!* for each student in their group.
3. Tell students that they will work *individually* to draw four possible model membrane designs in the boxes on their handouts, using any combination of the materials that they tested in Lesson 11 in any quantities that they think will work well. As they are working through this activity, they may use the chart that their group created as they tested materials in Lesson 11 (MMIC 11-4 (EiE® {3-3}): *Testing Model Membrane Materials*). This might help students choose an effective combination of materials for their model membrane designs.

Note: Be sure to make it clear to students that they will be able to combine a variety of these materials as they design their models, if they like. They should indicate on their handout which materials they would like to use.

4. Ask each student to share his/her designs with the rest of their group, using the following sentence frame displayed on page 11 of MMIC 12-IWB:

中文	English
在这个薄膜模型设计中，我用了 ____ (材料) 因为 _____。	In this model membrane design, I used... (material) because ...

5. After each student presents all four of his/her designs, have the group choose their favorite of the student's four designs and circle it on each student's handout. This will help them to narrow down their choices at the end of this activity and will assist in selecting the final design for their group to create and test. Ask 工作管理员 (**Terrific Taskmaster**) to be sure that everyone has a turn to speak and give an opinion. Ask 中文督察员 (**Chinese Champion**) to make sure that everyone speaks only in Chinese. Have 记录员 (**Remarkable Recorder**) circle the favorite choice from each student's designs.
6. Now have the groups choose one model membrane design from those they have circled. Tell them that they will use this design to create their group's model membrane. Ask 记录员 (**Remarkable Recorder**) to circle the group's final choice. As they decide which one to choose, have them use this sentence frame, displayed on page 12 of MMIC 12-IWB:

中文	English
我们觉得这种设计可能管用，因为 _____。	We think this design might work well because it is/it has...

Language Function-Form-Vocabulary Connections (Activity 4)		
CO LP 12.4.1	Distinguish the superlative degree among two or more things/ideas within a topic using a locative phrase 在...里/在...中 to identify the whole topic, and the superlative adverb 最	
Approaching	Attaining	Expanding
<p>在我的薄膜模型设计中，我喜欢的想法是.....。</p> <p>In my model membrane designs, the idea that I like is...</p>	<p>在这些薄膜模型设计中，我最喜欢的想法是.....。</p> <p>In these model membrane designs, my favorite idea is...</p>	<p>在这四个薄膜模型设计中，我没有比.....更喜欢的想法了。</p> <p>In these four model membrane designs, I don't have any other design that I like better than....</p>
Topic as noun phrase (在 zài + noun + 中), modifying noun phrase (subj + verb + 的) + main noun/subject + 是 (be verb) ...	Topic as noun phrase (在 zài + noun + 中), modifying noun phrase (subj + 最 superlative + verb + 的) + main noun/subject + 是 (be verb) ...	Topic as noun phrase (在 zài + noun + 中), subj. + negation + 比 (comparison marker) + noun phrase + 更 (than)...
Form focus		
1. The superlative adverb 最		
最 is an adverb that indicates the superlative form meaning “most,” “-est” and is placed immediately before the verb/adjectival verb is modifies.		
2. Use of “在 zài ... 中” as topic phrase		
<p>在 zài ... 中: describing time or location “in” or “inside of”</p> <ul style="list-style-type: none"> 在这些薄膜模型设计中: In these model membrane designs 在足球场上: on the soccer field 		
Noticing and awareness spotlight: Use of “没有比.....更” expression		
<p>没有比.....更(Don't have more ... than ...)</p> <p>Negative particle + verb + comparative</p> <p>Another way to express the superlative is to say there is nothing –er (better, bigger, worse, etc.).</p>		

CO LP 12.4.2	Make comparison between two things using A + 比 (comparison marker) + B + (更) + adjective structure		
Approaching	Attaining	Expanding	
第二个想法跟第三个想法不一样。 Idea #2 and idea #3 are different.	你的第三个想法比第一个想法更合适。 Your idea #3 is more suitable than idea #1.	你的第二个想法比第四个想法更能控制水流。 Your idea #2 can control the water flow better than idea #4.	
A + 跟 (and) + B + 一样 (same)/不一样 (different)	A + 比 + B + (更) + adj.	A + 比 + B + (更) + verb phrase	
Form focus: A + 比 + B + (更) + Adj.			
“A” and “B” can be either nouns or noun phrases. 比 (comparison marker) is positioned between A and B with the adjective placed after B.			
Noticing and awareness spotlight: Use of 更 (even, even more)			
The adverb 更 is placed before the adjective. It is often omitted if the adjective is monosyllabic; it is typically used if the adjective is multisyllabic.			

CO LP 12.4.3	Suggest an alternative idea using serial verb construction with pivotal noun phrase		
Approaching	Attaining	Expanding	
我们要用这个想法。我们不要用那个。 We should use this idea. We should not use that one.	我们要用她的第三想法代替她的第四想法。 We should use her idea #3 instead of her idea #4.	为什么我们不用他的第一个想法代替你的第三个想法? Why don't we use his idea #1 instead of your idea #3?	
Parallel SVO sentence construction used to first confirm and then disconfirm.	Subj. + auxiliary + Verb ₁ + (Object ₁ / Subj ₂) + Verb ₂ + Object ₂ .	为什么不 (why not) + Verb ₁ + (Object ₁ / Subj ₂) + Verb ₂ + Object ₂ ?	
Form focus: Subj. + Verb ₁ + Object ₁ + Verb ₂ + Object ₂			
A serial verb construction refers to a sentence with two or more verbs that are connected by one and the same event. One type of serial verb constructions is called the pivotal construction. A pivotal construction contains a noun phrase (Object ₁ / Subj ₂) that “pivots” between functioning as the object of Verb ₁ and the subject of Verb ₂ . An example: 设计薄膜模型的时候，我们用海绵代替咖啡过滤纸。 (When designing the model membrane, we used the sponge instead of the coffee filter.)			

CO LP 12.4.4	Predict degree of probability of something using auxiliary “helping” verbs	
For example:		
Approaching	Attaining	Expanding
我想这个可能管用。 I think this one is likely to work well.	我觉得／想你的第三个想法应该(不)管用。 I feel like/think that your idea #3 should (not) work well.	[根]据我的观察，我觉得／想你的第三个想法在我们的薄膜模型中应该管用。 Due to my observations, I think your idea #3 should work well in our model membrane design.
Use of adverb “可能” to express future possibility.	Use of auxiliary 应该 + optional negation particle 不 + adjectival verb 管用.	Use of adverb of cause phrase, subj. + verb + object complement (object + 在+ locative phrase + auxiliary 应该 + adjectival verb 管用).
Form focus		
1. Auxiliary “helping verbs”		
In Mandarin, auxiliary “helping verbs” indicate the ability, possibility, intention or desire to carry out an action. The following are examples of auxiliary “helping verbs”: 会 ‘will likely + verb’, 会 ‘will know + verb’, 能/可以 ‘able to + verb’, 要/应该 ‘ought to + verb’, 要/想 ‘want to + verb’, 可以 ‘allow to + verb’, 不可以 ‘prohibited to + verb’		
2. How auxiliary “helping verbs” are same/different from other verbs		
<p>Like other verbs, auxiliary verbs...</p> <ul style="list-style-type: none"> a. occur as the A element in A-not-A questions, for example, 薄膜的孔应该不应该很小? (Should the holes of a membrane be small?); b. can be negated, or example: 薄膜的孔不应该很大。 (The holes of a membrane should not be big.) <p>Unlike other verbs, auxiliary verbs ...</p> <ul style="list-style-type: none"> a. must co-occur with a verb or an assumed verb; For example, 薄膜的孔应该不应该很小? (Should the holes of a membrane be small?) b. does not take aspect markers such as 了(le), 过(guò), 着 zhe; c. cannot be modified by intensifiers, such as 很 (very) or 更 (even more); d. cannot be nominalized; e. cannot occur before the subject; f. cannot take a direct object. 		

Noticing and awareness spotlight: Placement of locative phrase
<p>Unlike in English, a locative phrase is placed either at the beginning of the sentence or before the main verb, NOT at the end of the sentence.</p> <p>A locative phrase, e.g., “在 zai + concrete noun +locative particle,” can be placed in a sentence as follows:</p> <ol style="list-style-type: none"> 1. Directly before the main verb. (typical placement) 我觉得／想海绵在我们的薄膜模型中应该管用。 I think a sponge could work well in our model membrane design. (Subj. + verb + object complement (object + 在+ locative phrase + auxiliary 应该 + adjectival verb 管用). 2. At the beginning of the sentence and set off by a comma. (for emphasis) 在咖啡过滤纸上，我们放了一块海绵。On the coffee filter, we put a sponge. (Locative phrase, subj + verb + past tense marker + object.) 3. After main verb in a 把-construction (giving emphasis to the direct object) 我们把一块海绵放在咖啡过滤纸上了。We placed a sponge on the coffee filter. (Subj + 把-construction [把 + object + verb + complement] + past tense marker.)

CO LP 12.4.5	State quantities of materials using numbers and appropriate classifiers	
<p>For example: 一张铝箔纸 (a piece of aluminum foil) 五张咖啡过滤纸 (five coffee filters) 三块纱布 (three pieces of cheesecloth) 两块海绵 (two sponges)</p>		
Approaching	Attaining	Expanding
个 (gè) people and general object 家 (jiā) families and business establishments 件 (jiàn) clothing 棵 (kē) plants 只 (zhī) insects and animals 支 (zhī) rod-shaped objects, e.g., pencil, Chinese paint brush 把 (bǎ) small objects and objects with a handle, e.g., scissors, chair 本 (běn) journals, books and files	张 (zhāng) thin and flat objects, e.g., aluminum foil, coffee filter 块 (kuài) pieces of small things, e.g., felt, sponge 位 (wèi) persons of status, e.g., professor, engineer 碗 (wǎn) things that come in bowls mostly, e.g., noodles, rice, water 场 (chǎng) events and happenings such as episode, e.g., soccer game	滴 (dī) a drop/a drip used for liquid items 对 (duì) couple/pair: modifies anything that comes in pairs 架 (jià) planes and large vehicles and a few smaller electric objects such as radios

Form focus: Number + Classifier + Object (noun)	
Classifiers are used when counting objects (nouns). Almost all nouns have a corresponding classifier. When learning a noun it is always good to learn its classifier.	
Noticing and awareness spotlight	
1. The difference between 二 and 两	
二	两
1) Counting: e.g., 一、二、三..... 2) Used in ordinal numbers: e.g., 第一 (first)、第二 (second)、第三 (third) 3) As last part of any higher number that ends in two: e.g., 十二 (12)、八十二 (82)	Used whenever a classifier is used to indicate “two of something”, see: Subj. + Verb + 两 + Classifier + Noun
2. The difference between 只 and 支	
只 (zhī)	支 (zhī)
只 is used for insects and animals.	支 is used for rod-shaped objects.
These two classifiers are homophones. They have the same pronunciation but different uses and meanings.	

CO LP 12.4.6	Support ideas/opinions using compound sentences with adverb 因此		
For example:			
Approaching	Attaining	Expanding	
第一个想法是不管用的，因为它太厚了。	海绵不能让足够的水通过，因此，我们认为你的第二个想法是不管用的。	由于毡布能让水慢慢地滴下来，因此，我们认为第四个想法是管用的。	
Idea #1 will not work well, because it is too thick.	The sponge does not allow enough water to pass through, as a result, we think your idea #2 does not work well.	Due to the fact that the felt lets water drip through slowly, as a result, we think idea #4 will work well.	
....., 因为 (because)..... 因为 (because)....., 所以 (so)....., 因此 (as a result, therefore),	由于 (due to)....., 因此 (as a result, therefore),	
Form focus:, 因此 (as a result, therefore),			
因此 (as a result, therefore) is an adverb that can be used instead of the conjunction 因为 in the second clause.			

Noticing and awareness spotlight	
1. Use of 由于 (due to)	
由于 (due to)....., reflects a more formal register and is more likely to be used in written communication.	
2. Simple descriptive sentence (Subj. + 是 + adj. +的)	
The “是 + adj. +的” structure is commonly used to describe something or someone. For example, 海绵是不管用的。(The sponge does not work.)	

CC LP 12.4.7	Make inferences based on visual clues		
Approaching	Attaining	Expanding	
我猜/想 I guess /think 也许/可能..... Maybe/ Perhaps... 在我看来..... It seems to me that .../In my opinion, ...	我敢肯定..... I bet that... 你的第二个想法告诉我们..... Your idea #2 tells us that...	我估计/推断/猜测..... I expect/deduce/suppose that ... 似乎..... It seems as if... 从你的设计中可以看到...../ 如你的设计所示..... As is seen in your design...	

CC LP 12.4.8	Negotiate to reach consensus		
Approaching	Attaining	Expanding	
好吧。 OK. 我同意。 I agree.	我同意你的想法。 I agree with your idea. 我也一样。 Same here.	不约而同。 We reach the consensus without consulting with each other.	
Noticing and awareness spotlight: Use of 吗? 吧? 呢?			
A few particles are commonly used at the end of questions. 吧? is used to invite agreement. 呢? is a tag question meaning “, and you?” 吗? is a question particle that is used when one expects a “yes” or “no” response.			

CC LP 12.4.9	Express agreement/disagreement	
For example:		
Approaching	Attaining	Expanding
好。 Good. 我同意。 I agree. 我也是/同意。 I also + verb (am/agree). 对。 Exactly/Correct.	你说得对。 You are correct. 你完全正确。 You're absolutely right. 我也是这么认为的。 I think so too. 我也不这么认为。 I don't think so either.	我的想法跟你的一样。 I share your thoughts. 我赞成。 I agree (more formal). 我完全赞同。 I agree with you entirely.
不。 No. 不好。 Not good. 不同意。 I don't agree with you. 不对。 Not exactly.	我不是这么认为的。 I don't think so. 是, 可是你不觉得.....? Yes, but don't you think... 我觉得我不同意。 I'm afraid I have to disagree.	我的意见跟你的不同。 My suggestions are different from yours. 我想和你讨论讨论..... I must take issue with you on that. 然而 However
Noticing and awareness spotlight: Repetition of verb		
Repetition of a verb, e.g., 讨论讨论 (to discuss), can be used to soften the tone of voice.		

Learning Activity 5

1. Ask the class what the third step is in the engineering design process, 设计 (*Plan!*). Again, refer to the whiteboard visual and uncover the third circle to display the word “plan.” Now refer to the steps on page 105 in the EiE® binder and lead the class through Steps 3 and 4 using MMIC 12-4 (EiE® {4-6}): *Designing a Model Membrane: Plan!*, one copy per group.
2. Review the correct measure words to use with each material and put those on the board for students to refer to as they are making their plan.
3. Invite 记录员 (**Remarkable Recorders**) to do the drawing of the group’s plan on MMIC 12-4 (EiE® {4-6}): *Designing a Model Membrane: Plan!*. Once groups have finished drawing their plan (with all materials labeled), they must show it to the teacher and get teacher approval. Only then may they send their 材料管理员 (**Magnificent Materials Manager**) to the materials table with their plan to pick up the necessary materials for their design. Have students use the following sentence frame as they request materials (page 13 of IWB):

中文	English
<p>为了制作薄膜模型，我们需要一个（两个）_____。</p> <p>我们要用一块_____来制作我们的薄膜模型。</p>	<p>To make our model membrane design we need one (or two etc.) _____.</p> <p>We need to use one (or two, etc.) _____ to make our model membrane design.</p>

Learning Activity 6

1. Draw students’ attention back to the Engineering Design Process graphic displayed on the whiteboard. Ask the class what the fourth step is in the engineering design process, 制作 (Create!). Uncover the corresponding circle and reveal the text. Now refer to the steps on page 106 of the EiE® binder and lead the class through Steps 6-10.

Note: Be sure that groups label their containers using masking tape and the names of the group’s members.

2. As groups finish assembling their models, call them one group at a time to bring their models to the bins that are in the front or back of the room. Help students to pour ½ cup (118.3 ml) of water from the pitcher into a measuring cup, then help them pour the water into the center of the model. Have them put the lid on their model.

Note: They may tape it shut, if necessary, but the lid needs to close completely.

3. Ask the students in the group to take turns saying what materials their group used in their model and why. Be sure that each student in the group has a turn. Encourage students to use the correct measure word in the noun phrase for each material:

中文	English
我们用了 ____ (材料), 因为_____。	We chose to use (# + material) _____ because it is/ it has...

4. Leave the models for 24 hours.

Note: If students see that the water went through their model membrane immediately, they may feel sad or upset. Help them to understand that this is an important part of the design process. Engineers learn what works by seeing what does not work. Reassure them that they will be able to improve their design tomorrow. Encourage them to start to think of how they might use the materials differently tomorrow as they redesign their model.

Expansion Phase--“Beyond” activities

Students record their model membrane designs in their science notebooks.

Time: Learning Activity 7—20-30 minutes

Learning Activity 7

1. Have students take out their science notebooks.
2. Ask them to draw and label their group’s chosen plan in their science notebooks (each student should draw and label the model in his/her own science notebook).
3. Then ask students to find a partner from a different group. Have each partner describe which materials they used for the model membrane design and why. Make sure to review the sentence structure students will need to communicate this.
4. Finally, have students return to their groups and using the sentence structure that they used to orally describe their models ask them to write one sentence under their drawing of their model explaining why they chose to use these materials in their design. Display the sentence frame on the whiteboard:

中文	English
我们用了 ____ (材料), 因为_____。	We chose to use (# + material) _____ because it is/ it has...

Language Function-Form-Vocabulary Connections (Activity 5-7)		
CO LP 12.5-7.1	State quantities of materials using numbers and appropriate classifiers	
<p>For example:</p> <p>一张铝箔纸 (a piece of aluminum foil)</p> <p>五张咖啡过滤纸 (five coffee filters)</p> <p>三块纱布 (three pieces of cheesecloth)</p> <p>两块海绵 (two sponges)</p>		
Approaching	Attaining	Expanding
个 (gè) people and general object 家 (jiā) families and business establishments 件 (jiàn) clothing 棵 (kē) plants 只 (zhī) insects and animals 支 (zhī) rod-shaped objects, e.g., pencil, Chinese paint brush 把 (bǎ) small objects and objects with a handle, e.g., scissors, chair 本 (běn) journals, books and files	张 (zhāng) thin and flat objects, e.g., aluminum foil, coffee filter 块 (kuài) pieces of small things, e.g., felt, sponge 位 (wèi) persons of status, e.g., professor, engineer 碗 (wǎn) things that come in bowls mostly, e.g., noodles, rice, water 场 (chǎng) events and happenings such as episode, e.g., soccer game	滴 (dī) a drop/a drip used for liquid items 对 (duì) couple/pair: modifies anything that comes in pairs 架 (jià) planes and large vehicles and a few smaller electric objects such as radios
Form focus: Number + Classifier + Object (noun)		
Classifiers are used when counting objects (nouns). Almost all nouns have a corresponding classifier. When learning a noun it is always good to learn its classifier.		
Noticing and awareness spotlight		
1. The difference between 二 and 两		
二	两	
1) Counting: e.g., 一、二、三..... 2) Used in ordinal numbers: e.g., 第一 (first)、第二 (second)、第三 (third) 3) As last part of any higher number that ends in two: e.g., 十二 (12)、八十二 (82)	Used whenever a classifier is used to indicate “two of something”, see: Subj. + Verb + 两 + Classifier + Noun	

2. The difference between 只 and 支	
只 (zhī)	支 (zhī)
只 is used for insects and animals.	支 is used for rod-shaped objects.
These two classifiers are homophones. They have the same pronunciation but different uses and meanings.	

CO LP 12.5-7.2	State use/function of something using nominalization and purpose verb phrase, 来 + verb + object	
Approaching	Attaining	Expanding
我们用一块海绵、两张咖啡滤纸，和一块毡布制作薄膜模型。	我们想用一块海绵、五张咖啡滤纸，和一张铝箔纸来制作我们的薄膜模型。	我们想用一块海绵、两块毡布，和一张有一个孔的铝箔纸来制作我们的薄膜模型。
We need a sponge, two coffee filters, and a piece of felt to create the model membrane.	We want to use a sponge, five coffee filters, and a piece of aluminum foil to create our model membrane.	We want to use a sponge, two pieces of felt, and one piece of aluminum foil with one hole to create our model membrane.
Subj. + Verb ₁ + Object ₁ + Verb ₂ + Object ₂ [Verb ₁ and Verb ₂ are parallel verbs. They are both actions performed by the same Subj.]	Subj. + Auxiliary Verb + [Verb ₁ 用 + pronoun + 的 + Object ₁ + 来 + Verb ₂ + Object ₂ + 的].	Subj. + Verb ₁ 需要 + Verb ₂ 用 + pronoun + 的 + Object ₁ + purpose verb phrase [来 + Verb ₃ + Object ₃]
Form focus		
1. Multiple uses of 来		
<ol style="list-style-type: none"> “来” as an action verb, meaning “to come”. e.g., 他昨天来过两次。(He came twice yesterday.) “来” is used to replace the verb in previous sentence. e.g., 把这杯茶喝完，我们再来一瓶！(Drink up this cup of tea, we will drink another!) “来” is placed in front of a verb phrase, indicating purpose. e.g., Juan Daniel 需要水杯来喝水。(Juan Daniel needs a water bottle to drink water.) “来” is used to indicate the direction of an action verb. e.g., 你把那本书拿来！(Bring that book over here!) 		
2. Use of punctuation mark “、” vs. “，”		
<p>In written Chinese, “、” is typically used when you want to list a series of actions or items. For example, 工程设计步骤的五个步骤：提问、思考、在家中找材料并设计、制作、测试并改进。 The five steps of the Engineering Design Process are: Ask questions, imagine solutions, make a plan, create a model, and improve it.</p>		





Written Chinese also has the “，” (comma). The comma is used to set off a dependent clause or an adverbial phrase.
 上星期冠军赛的时候，Juan Daniel 和队友们**起初**落后，**稍后**他们用工程设计程序制定了一个取胜的好办法，**于是**他们取得了胜利。
 In the championship game last week, Juan Daniel’s team was losing at the beginning, afterwards they came up with a plan using the engineering design process, and finally, they won the game.

CO LP 12.5-7.3 Report about things, actions, or events in past time using action verbs with 了 (temporal marker) and adverbs of time		
Approaching	Attaining	Expanding
我们用两张咖啡过滤纸和一块毡布。 We use two coffee filters and one piece of felt.	在我们的薄膜模型的设计中，我们用了一块海绵、三张咖啡过滤纸，和一块毡布。 We used a sponge, three coffee filters, and one piece of felt in our model membrane design.	昨天，我们用了两张咖啡过滤纸和一块毡布。 We used two coffee filters and one piece of felt yesterday.
No temporal marker, no adverb of time	Temporal marker 了 used	Temporal marker 了 and adverb of time used
Form focus: action verb + 了 (temporal marker) + adverb of time		
Past time can be communicated using “了”, adverbs of time or both.		
Noticing and awareness spotlight: Position of temporal marker “了”		
The temporal marker “了” is positioned either immediately after the main verb or at the end of the sentence/clause.		

CO LP 12.5-7.4 Give reasons for actions/choices/preferences using preposition 为了		
Approaching	Attaining	Expanding
我们用了.....，因为咖啡过滤纸让太多的水通过。 We used....., because coffee filters allowed too much water to pass through.	为了让水流得慢一些，我们用了更多的毡布。 In order to slow the rate of water flow we used more pieces of felt.	我们选择.....的原因是..... The reason that we chosewas....

<p>....., 因为 (because)..... 因为 (because)....., 所以 (so).....</p>	<p>Preposition/coverb (为了/for the purpose of) + 让/使- construction [让/使+ Object + V + adv. phrase [得 (adv. marker) + adv.]], Subj. + V + adj. phrase [adv. 更 + adj. 多+ adj. marker 的] + Object.</p>	<p>Adjective phrase [Subj. pronoun + V + Object + 的] + Noun/Subject (原因)+ V(是)</p>
<p>Form focus: Use of 让/使-construction</p>		
<p>Similar to “把-sentence,” the “让/使-construction” allows one to place the direct object in front of the main verb, which is not typical word order in Chinese. This draws more attention to what is happening to the object itself.</p>		
<p>Noticing and awareness spotlight</p>		
<p>1. Placement of preposition/coverb</p>		
<p>Prepositions/coverbs such as 为了 (for the purpose of) introduce a noun phrase. Together, the preposition + noun phrase combination are typically placed before the main SVO in the sentence. In sentence initial position they add emphasis.</p>		
<p>2. Difference between 的 (de) and 得 (de)</p>		
<p>的 is used to modify a noun. 的 precedes the noun it modifies, e.g., adjective + 的 + noun; 得 is used to modify a verb. 得 follows the verb it modifies, e.g., V + 得 + adverb</p>		

<p>CO LP 12.5-7.5</p>	<p>Construct characters to form words and phrases adhering to character structure rules and stroke order guidelines</p>
<p>For example: Left-right: 叫、场 Top-bottom: 吉、只 Left, middle, right: 树、谁 Top, middle, bottom: 复、常 One-part, totally enclosed: 国、回 Partially enclosed: 用、原</p>	

Approaching	Attaining	Expanding
<p>One- and two-part characters</p> <p>One-part character 我、生</p> <p>One-part, totally enclosed 国、回</p> <p>Two-part characters Left-right: 叫、场 Top-bottom: 吉、只</p>	<p>Three-part characters</p> <p>Left, middle, right: 树、谁 Top, middle, bottom: 复、常 Left, top-right, bottom-right: 锋、纷 Top-left, bottom-left, right: 部、剂、劲 Left-top, right-top, bottom: 然、赞 Top, left-bottom, right-top: 死、前</p>	<p>Four + part characters</p> <p>Left-top, right-top, left-bottom, right bottom: 能、舒 Left, top-right, middle-right, bottom-right: 慢、镜 Left, middle, top-right, bottom-right: 游 Left, middle-top, middle-bottom, right: 湖</p>
Form focus: Formation of Chinese characters		
1. Character structure rules		
<p>Chinese characters are called “square” characters because no matter how simple or complex, each character fits inside a square. Characters can usually be divided into different parts. These parts form character structures. There are four main structures: one-part structure, two-part structure, three-part structure, and four-part structure. These structures can be further divided into sub-parts.</p> <p>For example,</p> <p>Two-part structures:  (top/bottom),  (left/right)</p> <p>Three-part structures:  (left, top-right, bottom-right),  (top-left, bottom-left, right), etc.</p>		
2. Stroke order guidelines		
<p>General rules for writing Chinese characters are:</p> <ol style="list-style-type: none"> 1. Horizontal first, then vertical. 2. Top first, then bottom. 3. Left first, then right. 4. Left-slanted first, then right-slanted. 5. Outside first, then inside. 6. Center first, then both sides. 7. With “closed” characters, enter character first, then close it up. 		

CO LP 12.5-7.6	Use a developing understanding of basic units of word formation in Chinese to infer and construct meaning with written text
Form focus: radical → character → compound/word	
1. radical	
<p>A radical is the smallest meaningful orthographic unit in compound characters, for example, 虫 (insect) is used in the character 蛙 (frog). 虫 (insect) can also be a stand-alone character. There are three types of radicals: semantic (give information about character meaning) [手 (hand)], phonetic (give information about character pronunciation) [分 (fen) in the compound 纷 (one after another)], and perceptual (do not give information about character meaning or pronunciation, instead function as visual fillers) [此 (this, these in classical Chinese), however, in the compound 嘴 (mouth) the radical 此 functions as a perceptual radical providing information about neither meaning nor pronunciation].</p>	
2. character	
<p>A Chinese character is a meaningful orthographic unit that is always pronounced as one syllable. Chinese characters have evolved as a writing system over millennia and have developed in various ways.</p> <p>Some characters are pictographs that were originally drawings of concrete objects, for example, 雨 (rain), the four dots depicting the rain coming down from the sky; others are better described as ideographs because they were created as graphic representations of more abstract ideas such as the notion of “above”, 上, the stroke above the horizontal line indicating the idea of “above” or “up.” Another way to create characters was to combine two or more pictographs or ideographs to portray a new meaning, for example, 休 (to rest), a combination of the pictographs for person, 人, and a person leaning against a tree, 木. These types of characters are referred to as ideogrammatic characters.</p> <p>Over 90% of Chinese characters were created as phono-semantic compound characters and are made up of a combination of semantic and phonetic radicals. For example, 控 (to control), the semantic radical on the left side, 手 (hand), indicates that the word meaning will include an action with a hand, and the phonetic radical on the right side 空 (kōng), helps the reader with character pronunciation “kòng.”</p>	
3. compound	
<p>Compounds consist of at least two characters, neither of which is an affix, a character that on its own lacks meaning but when added to other characters becomes a meaningful unit. Most Chinese words are compounds. Compounds have various types of syntactic relationships.</p> <p>A few compound types:</p> <p><i>Verb-Object:</i> 踢足球 (to kick soccer ball)、开球 (to kick of)、发誓 (to pledge)</p> <p><i>Verb-Complement:</i> 摔倒 (to fall down)、改进 (to improve and get better)、进来 (to come in)</p> <p><i>Subject-Predicate:</i> 天亮 (bright [sky is bright])</p> <p><i>Number-Classifier:</i> 各种 (various kinds)、一道 (a ray of...)、一片 (a patch of...)</p> <p><i>Adverb-Verb:</i> 慢跑 (to jog [to run slowly])、快走 (to hurry [to walk fast])</p>	

<p>Verb-Verb-Noun: 栖息地 (habitat [to stay and rest at a place]) Adjective-Adjective-Noun: 浅桃色 (light peach color)、吉祥物 (mascot [happy and auspicious object])</p>
4. word
<p>A word is written with one or more Chinese characters. A word can consist of a single character (脚, foot), a compound (幸运, lucky), a duplicate (招招手, to wave), or an affixed form (第一, first, 第二, second, etc.).</p>

CC LP 12.5-7.7	Make a request using different degrees of politeness		
Approaching	Attaining	Expanding	
<p>我们需要两张咖啡滤纸。 We need two coffee filters.</p> <p>我们要两张咖啡滤纸。 We want two coffee filters.</p>	<p>请给我们两张咖啡滤纸。 Please give us two coffee filters.</p>	<p>麻烦您给我们两张咖啡滤纸。 Would you give us please?</p>	

CC LP 12.5-7.8	Give a command using serial verb construction		
Approaching	Attaining	Expanding	
<p>用/试一试海绵吧! Use/Try the sponge!</p> <p>我们用/试一试海绵吧! Let's use/try sponge!</p> <p>Verb + noun + 吧 (ba)!</p>	<p>我建议用/试一试..... I suggest we use/try...</p> <p>你可以用/试一试..... You may use/try.....</p> <p>Subj. + Verb₁ + Verb phrase (verb₂ + noun phrase)</p>	<p>为什么不用/试一试毡布? Why don't you use/try the felt?</p> <p>我们最好用/试一试毡布。 You'd better use/try the felt.</p> <p>为什么不 (Why not) + Verb + Object</p>	
Form focus: Subj. + Verb ₁ + Verb phrase (verb ₂ + noun phrase)			
<p>A serial verb construction refers to a sentence with two or more verbs that are connected by one and the same event. In this type of serial verb construction the second verb is a verb phrase that functions as the object of the sentence.</p>			
Noticing and awareness spotlight: Use of 吧 (ba)			
<p>吧 (ba) is a particle which is used at the end of a sentence to indicate a suggestion.</p>			

Evidence of learning

- Completed handouts:
 - MMIC 12-2 (EiE® {4-4}): *Designing a Model Membrane: Ask!*
 - MMIC 12-3 (EiE® {4-5}): *Designing a Model Membrane: Imagine!*
 - MMIC 12-4 (EiE® {4-6}): *Designing a Model Membrane: Plan!*
- Oral contributions to story retell using pictures from Chapters 1-6 from *Juan Daniel*
- Oral contributions to “Show and Tell” with model membrane materials and review of the findings from the testing materials experiment
- Use of Mandarin only in small group work
- Oral description of the group’s completed model to the teacher
- Oral description and explanation of the group’s completed model to a partner
- Completed science notebook entry

Vocabulary List

Content-obligatory (CO)

了解 Recognize			
Pīnyīn	Characters	English meaning	Parts of speech
bàn gè	半个	one half	measure word
bēi	杯	cup	noun
bó mó mó xíng de tè xìng	薄膜模型的特性	properties of model membrane	noun phrase
cái liào de tè xìng	材料的特性	properties of materials	noun phrase
cái liào míng chēng	材料名称	material name	noun
cè liáng	测量	to measure	verb
chéng gōng	成功	success	noun
fēn shù	分数	fraction	noun
háo shēng	毫升	milliliter	measure word
néng gòu kòng zhì liú sù	能够控制流速	to be able to control rate of flow	verbal phrase
shǎn liàng	闪亮	shiny	adjective
sì fēn zhī yī	四分之一	one fourth/quarter	measure word
tǐ jí	体积	volume	noun
xiǎo shù	小数	decimal	noun
yè tǐ liáng bēi	液体量杯	measuring cup	noun
识记 Produce			
Pīnyīn	Characters	English meaning	Parts of speech
bái sè de/mǐ sè de	白色的/米色的	white/beige	adjective
bǎo hù	保护	to protect	verb
bó	薄	thin	adjective
bó mó	薄膜	membrane	noun
bù zhòu	步骤	step	noun
chǎng jǐng	场景	setting	noun
chuān guò/tōng guò	穿过/通过	pass through	verb
dī	滴	to drip	verb
fǔ zhù gài niàn	辅助概念	supporting ideas	noun
gǎi jìn	改进	improve	verbal phrase
gōng chéng shè jì bù zhòu	工程设计步骤	Engineering Design Process	noun
gōng chéng shī	工程师	engineer	noun

hǎi mián	海绵	sponge	noun
hòu	厚	thick	adjective
jiě jué	解决	solution	noun
kā fēi guò lǜ zhǐ	咖啡过滤纸	coffee filter	noun
kē xué jiā	科学家	scientist	noun
kē xué rì zhì	科学日志	science notebook/journal	noun
liú guò	流过	to flow through	verb
lǚ bó zhǐ	铝箔纸	aluminum foil	noun
méi yǒu dòng/méi yǒu kǒng	没有洞/没有孔	does not have holes	verb
mó xíng	模型	to model/modeling	verb
ní lóng shā chuāng bù	尼龙纱窗布	nylon screen	noun
píng huá	平滑	smooth	adjective
qù jiě jué shí jì wèn tí	去解决实际问题	to solve real-world problems	verbal phrase
rén wù	人物	characters	noun
rén zào de bó mó	人造的薄膜	human-made membrane	noun phrase
shā bù	纱布	cheesecloth	noun
shè jì	设计	to design	verb
shè jì	设计	plan	verbal phrase
shí jiān	时间	time of day	noun
shì jiàn	事件	events	noun
shí yàn	实验	experiment	verb/noun
shí yàn	实验	experiment	verb/noun
shì yí shì xīn de xiǎng fǎ	试一试新的想法	to try out new ideas	verbal phrase
sī kǎo	思考	imagine	verbal phrase
tí wèn	提问	ask	verbal phrase
tiān rán de bó mó	天然的薄膜	natural membrane	noun phrase
tuī cè	推测	to predict/prediction	verb/noun
wèn tí	问题	problem	noun
yǒu dòng/yǒu kǒng	有洞/有孔	has holes	verb
yùn yòng xiǎng xiàng lì	运用想象力	to use imagination	verbal phrase
zhān bù	毡布	felt	noun

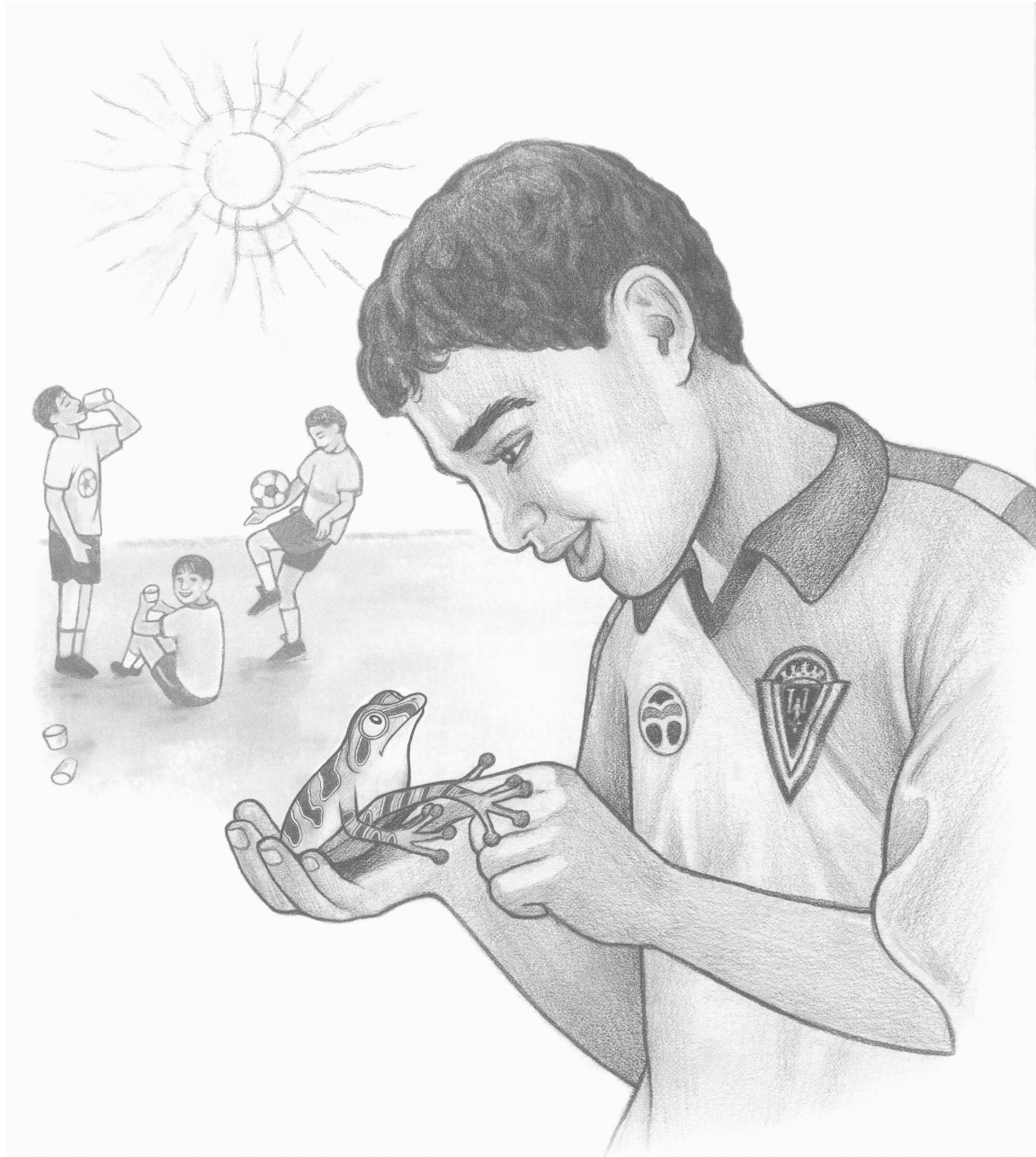
zhì zuò	制作	create	verbal phrase
zhǐ zuò de	纸做的	made of paper	adjective
zǔ dǎng	阻挡	block	verb

Content-compatible (CC)

了解 Recognize			
Pīnyīn	Characters	English meaning	Parts of speech
bǎ tā zhé qǐ lái	把它摺起来	to fold something	verb
chuān (dòng/kǒng)	穿 (洞/孔)	to pierce holes	verb
fēn céng	分层	to layer	verb
gài zi	盖子	lid	noun
huǒ bàn	伙伴	partner	noun
jiǎn	剪	to cut	verb
lún liú	轮流	to rotate	verb
quán bān	全班	whole class	noun
róng qì	容器	container	noun
shuǐ bēi	水杯	water pitcher	noun
wén jiàn jiá	文件夹	folder	noun
xiǎo zǔ	小组	small group	noun
xiū jiǎn chéng shì hé de dà xiǎo	修剪成适合的大小	to cut and make something fit	verbal phrase
zhǎn shì	展示	Show and Tell	verb
zhé	折	to bend	verb
识记 Produce			
Pīnyīn	Characters	English meaning	Parts of speech
cái liào guǎn lǐ yuán	材料管理员	Magnificent Materials Manager	noun
gōng zuò guǎn lǐ yuán	工作管理员	Terrific Taskmaster	noun
jì lù yuán	记录员	Remarkable Recorder	noun
yǎn shì zhì jiǎn yuán	演示质检员	Polished Presenter	noun
zhōng wén dū chá yuán	中文督察员	Chinese Champion	noun





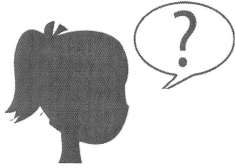








姓名： _____ 日期： _____



设计薄膜模型

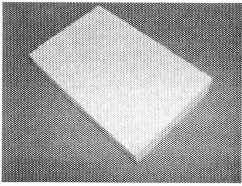
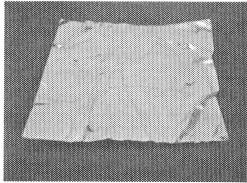
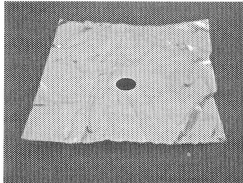
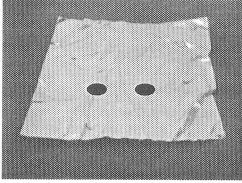
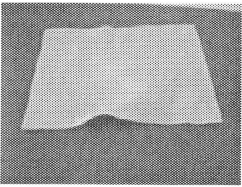
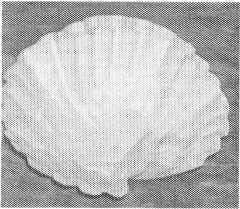
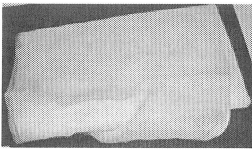
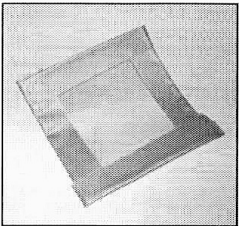
工程设计步骤：提问！

1. 圈出薄膜模型的功能，并划掉错误的。

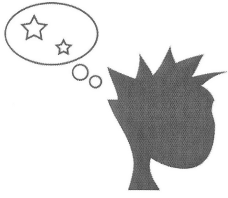
我的薄膜模型应该.....

- 让水通过
- 不让水通过
- 让水快速地通过
- 让水慢速地通过

2. 预测：把你认为适合的薄膜模型的材料圈出来。

<p>海绵</p> 	<p>铝箔纸</p> 	<p>有一个孔的铝箔纸</p> 	<p>有两个孔的铝箔纸</p> 
<p>毡布</p> 	<p>咖啡过滤纸</p> 	<p>纱布</p> 	<p>尼龙纱窗布</p> 

姓名: _____ 日期: _____



设计薄膜模型 工程设计步骤：思考！

说明：动脑子想一想不同的薄膜模型设计，把你的想法写在下面的格子里或画出来，然后圈出你觉得最好的设计。

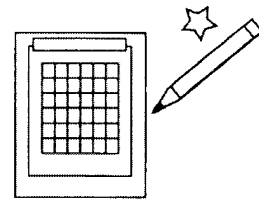
设计#1	设计#2
设计#3	设计#4

姓名： _____ 日期： _____

设计#

设计薄膜模型

工程设计步骤：设计



说明： 在下面的方格里画出薄膜模型的设计图，并且标上各个部位。

1. 列出需要的材料

2. 你觉得水通过薄膜模型的速度是快还是慢？ 为什么？

为什么 Juan Daniel 担心那只他找到的青蛙？

为什么水对青蛙来说这么重要？

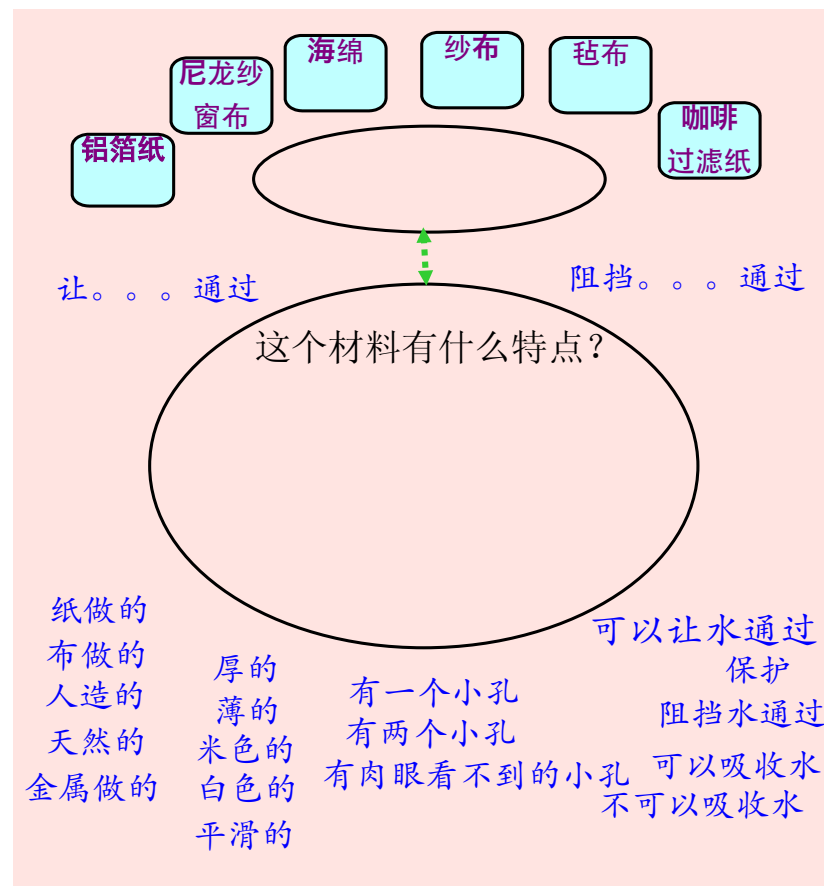
青蛙怎样喝水？

Juan Daniel 要如何给青蛙补充水分？

他设计薄膜模型的时候有哪些步骤？

这是什么材料？

Teacher: display photos taken during the Lesson 11
“Materials Testing” activity



通过试验你学到了关于这种材料的哪些知识？

我们学到了_____可能管用，因为_____。

我们学到了_____可能不管用，因为_____。

谁?	科学家	工程师
他们做什么?		
为什么?		
他们用什么方法工作?		
他们的方法有什么步骤?		

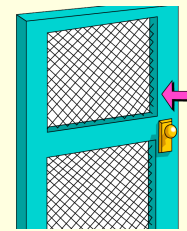
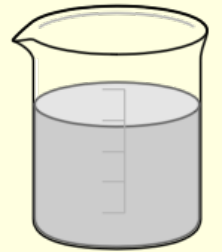
在设计模型的时候, ○ ○ ○ ○ ○ ○

今天, 你们要像 Peters 女士和 Juan Daniel 一样, 做一个生物工程师。你们将:

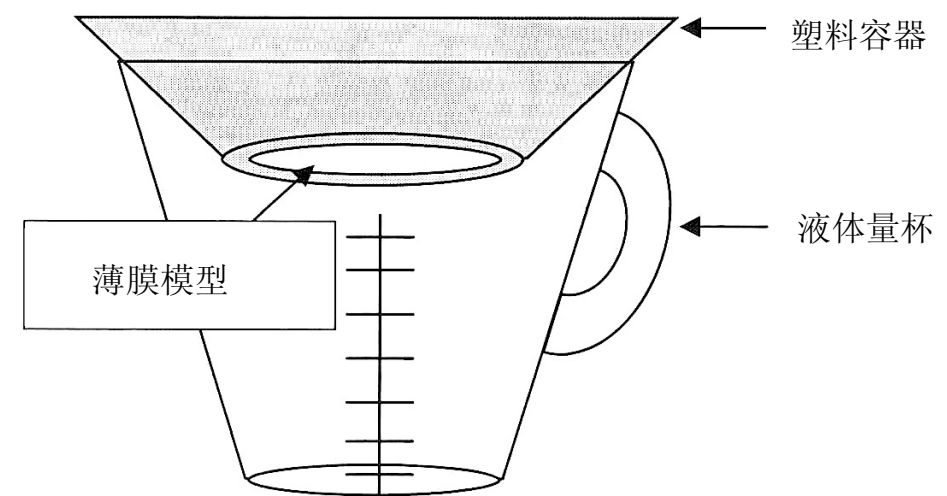
- 从这六种材料中选出一些材料做一个薄膜模型, 让水慢慢地滴到容器底部的塑料青蛙上。
- 你们可以用各种方法组合这六种材料。
- 把这些材料剪成适合放在容器里的大小, 而且可以盖上盖子。
- 向薄膜模型里倒 1/2 杯 (118.3 毫升) 的水。
- 24 小时以后, 看看多少水通过薄膜滴到杯底。 [杯底必须少于 1/4 杯的水 (59.1 毫升) 才算成功]



在葡萄干的实验中, 你们学到了关于薄膜的哪些知识?



在测试材料的实验中, 关于各种可以用来制作薄膜模型的材料, 你们学到了什么?



中文督察员或演示质检员

- 鼓励大家只说中文
- 帮助小组成员使用正确的字词和短语
- 向全班汇报结果

记录员

- 记录小组的答案

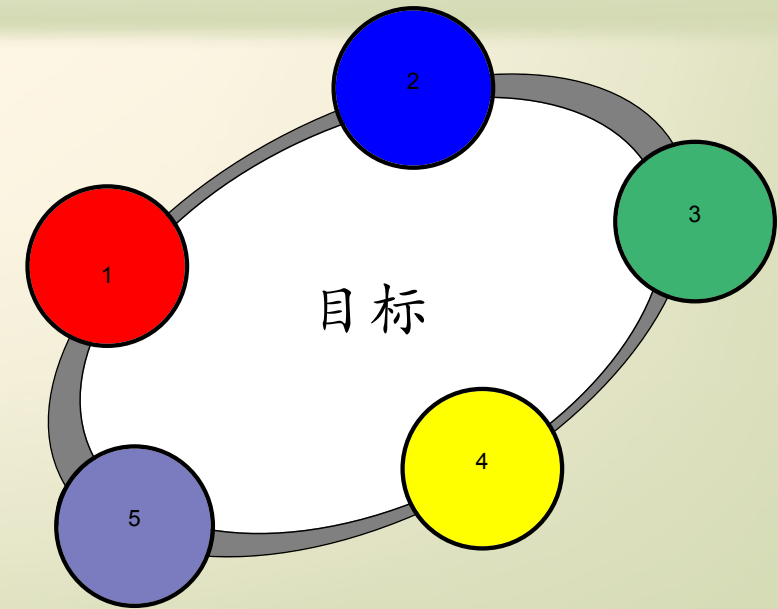
材料管理员

- 领取并分发各种材料
- 把实验用的材料放回正确的位置

工作管理员

- 确保小组成员掌握时间
- 带领小组一步一步的执行任务
- 向每个测试的材料中倒水

工程设计步骤



在这个薄膜模型设计中，我们用了 ___ (材料)
因为_____。

我们觉得这种设计可能管用，因为 _____。

为了制作薄膜模型，我们需要一个（两个）
_____。

我们要用一（块）_____来制作我们的
薄膜模型。

在我们的薄膜模型设计中，我们用了____
(材料)，因为_____。